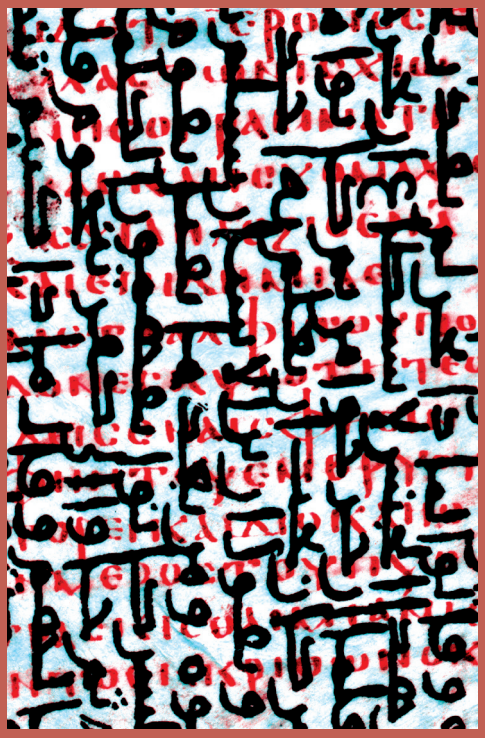
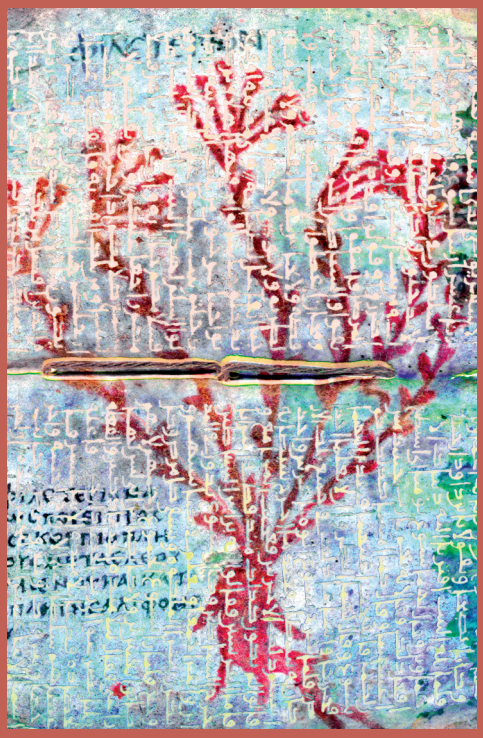
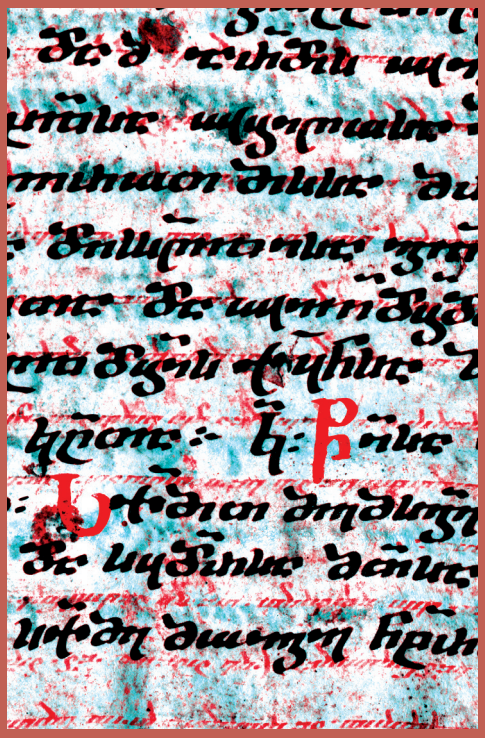

New Light on Old Manuscripts

The Sinai Palimpsests and Other Advances in Palimpsest Studies

Edited by Claudia Rapp, Giulia Rossetto, Jana Grusková, Grigory Kessel

AUSTRIAN ACADEMY OF SCIENCES PRESS

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EDITORIAL REMARKS

For constant and meticulous care in accompanying every step of this volume we gratefully acknowledge the input of Christian Gastgeber. For copy-editing and typesetting, the editors are immensely grateful to Katharina Preindl.

In general, and especially for the spelling of personal names, we follow the standards of the *Oxford Dictionary of Byzantium*, ed. A. P. Kazhdan, A.-M. Talbot, 3 vols. (Oxford, 1991).

The most commonly used abbreviations are listed in the 'List of Abbreviations' on page 11 of this volume.

This is a volume with contributions in English, French, German, and Italian. Each contribution strives for consistency in itself in following established conventions for citations and references to manuscripts. We have refrained from imposing consistency in this regard across all the contributions of this volume, as this would be a futile undertaking prone to introduce errors. For references to manuscripts in the Holy Monastery of St. Catherine, however, we use the reference system of the Sinai Palimpsests Project (https://sinai.library.ucla.edu/) across all contributions.

All images of Sinai manuscripts, unless otherwise indicated, were created by the Early Manuscripts Electronic Library (EMEL) in the context of the Sinai Palimpsests Project, and are copyright of the Holy Monastery of St. Catherine.

All manuscripts (inlcuding papyri and maps) are listed in the index of manuscripts at the end of the volume.

ABBREVIATIONS

BHG	Halkin, François, *Bibliotheca hagiographica graeca*, 3 vols. (Brussels, 1957)
BHO	Peeters, Paul *et al.*, *Bibliotheca hagiographica orientalis* (Brussels, 1910)
BT	Babylonian Talmud
CNRS	Centre national de la recherche scientifique
CPA	Christian Palestinian Aramaic
CPG	Geerard, Maurice *et al.*, *Clavis Patrum Graecorum*, 5 vols. (Turnhout, 1974–2003)
Diktyon	Database of Greek Manuscripts, Institut de recherche et d'histoire des textes (IRHT), Paris; http://www.diktyon.org/ (01.07.2023)
EMEL	Early Manuscripts Electronic Library; http://emel-library.org/ (01.07.2023)
LDAB	Leuven Database of Ancient Books; http://www.trismegistos.org/ldab/ (01.07.2023)
ÖAW	Österreichische Akademie der Wissenschaften
PG	Migne, Jacques-Paul *et al.*, *Patrologiae cursus completus, omnium SS. Patrum, Doctorum Scriptorumque ecclesiasticorum. Series Graeca*, 161 vols. (Paris, 1856–1866)
PL	Migne, Jacques-Paul *et al.*, *Patrologiae cursus completus, omnium SS. Patrum, Doctorum Scriptorumque ecclesiasticorum. Series Latina*, 221 vols. (Paris, 1844–1855)
PT	Palestinian Talmud
SPP	Sinai Palimpsests Project; https://sinai.library.ucla.edu/ (01.07.2023)
TLG	Thesaurus Linguae Graecae; http://stephanus.tlg.uci.edu/ (01.07.2023)
UTO	Undertext Object

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Claudia Rapp

Introduction

More than two centuries have passed since palimpsested manuscripts first attracted the attention of scholars in search of the written heritage of Greco-Roman antiquity and the foundational texts of Christianity. In 1819, a complete copy of Cicero's *De re publica* (*The Republic*) was discovered in the Vatican Library by Angelo Mai, who may be considered the founder of palimpsest studies. The Old Syriac Gospels, preserving an earlier text than the oldest Greek witness of the text in manuscript form, was discovered by Agnes Smith Lewis at St. Catherine's Monastery in 1892. Nearer to our own times, a new text of the 3rd-century BC mathematician Archimedes has been made legible by a team of imaging scientists and scholars, in a project which started in 1998 in the US.[1] In 2003, passages from a comedy of the ancient Greek author Menander in the Vatican Library were discovered and later captured through multispectral imaging.[2] In 2008/2009, new passages of the 3rd-century CE historian Dexippus were found in the Austrian National Library in Vienna. These passages offer one of the earliest witnesses of the movement of the Goths across the Danube to the Roman Empire.[3] As these examples indicate, individual texts that had once been erased have been coming to light, one by one.

Palimpsested manuscripts also facilitate the recovery of languages that have fallen into obsolescence. One of the milestones in palimpsest studies is associated with Zaza Aleksidze's discovery, in the Library of the Monastery of St. Catherine, of 250 pages of the Gospel of John and a Bible Lectionary, both in Caucasian Albanian.[4] That the Albanians of the Caucasus had their own writing was well established, but the written form of Caucasian Albanian had until then only been known from a few words in inscriptions on stone and clay, and a glossary of the 15th century. Gothic, Glagolitic, and Christian Palestinian Aramaic are other 'lost' or poorly-attested languages for which erased layers offer substantial evidence.[5]

The scope of the study of palimpsests was taken to a new level through a Europe-wide collaboration. In 2001, at the initiative of Dieter Harlfinger, scholars and librarians from 50 institutions in 26 countries joined tougher in the Rinascimento virtuale project. Financed by the European Research Council, the aim of the project was the first systematic and comparative study of palimpsests in the major libraries of Europe.[6]

The technologies for the study of palimpsests have evolved in step with this scholarly work, with increasing speed. Only a century ago, Agnes Smith Lewis gleefully reported on her use of a foul-smelling liquid to render the erased text of the Old Syriac Gospels legible, if only for a brief moment.[7] Today, ever more refined methods of multi-spectral imaging in conjunction with ever more sophisticated procedures for computer-based image processing allow the study of the minutest details of erased ink and its traces on the parchment surface. Palimpsest studies have become the business of teams of scholars and technicians who assemble for a specific project, while major libraries increasingly invest in setting up permanent equipment of their own. With these advances in technologies and scholarship, the dialogue between scholars knowledgeable in texts and scripts on the one

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1 Netz *et al.* (eds.), *The Archimedes Palimpsest*.

2 The imaging of this manuscript, which is of Sinaitic provenance, was undertaken by the Early Manuscripts Electronic Library in 2014: http://emel-library.org/projects-3/ (accessed 01.07.2023).

3 See most recently Mitthof *et al.* (eds.), *Empire in Crisis: Gothic Invasions and Roman Historiography.*

4 The most recent edition is Gippert *et al.*, (eds.), *The Caucasian Albanian Palimpsests of Mount Sinai*.

5 For further references see the contributions by Jost Gippert (Caucasian Albanian), Carla Falluomini (Gothic), Heinz Miklas (Glagolitic) and Christa Müller-Kessler (Christian Palestinian Aramaic) in this volume.

6 http://www.rinascimentovirtuale.eu (accessed 01.07.2023).

7 See most recently Rossetto, *Greek Palimpsests at Saint Catherine's Monastery*.

hand, and experts in image capture and image processing on the other, becomes ever more lively to the extent that they become increasingly knowledgeable of each others' methods.[8]

The largest single collection of palimpsests that we know of is in the library of the Holy Monastery of St. Catherine in the Sinai. The Old Collection, together with the New Finds, holds at least 170 items with erased writing, in ten different languages. That many of these items, often just fragments or loose quires, have survived at all is due to their preservation in a depository that was only made accessible in 1975. These fragments are known as the 'New Finds'. When Paul Géhin and Stig Frøyshov took stock of this discovery, they also laid out the research agenda for the future: 'Cela rend nécessaire une bonne collaboration entre spécialistes des différentes langues et disciplines et la communication des documents aux chercheurs sous forme de microfilms … C'est alors qu'apparaîtra encore avec plus d'éclat la valeur inestimable de la bibliothèque sinaïtique, véritable "conservatoire de l'Orient chrétien".'[9] These words were written in 2000. Today, scholars may no longer be working with microfilms, but what remains urgent is their call for a collaboration of experts from different disciplines to take the full measure of the Sinai library as a treasure trove of the Christian Orient.

THE GENESIS OF THIS VOLUME

This volume represents the next chapter in the collaboration of specialists in different languages and disciplines envisioned by Géhin and Frøyshov only two decades ago. At its core lies the work of the Sinai Palimpsests Project, which resulted in the imaging, image processing, and text identification of about half of the known palimpsested items in the Holy Monastery of St. Catherine in the Sinai. This was the first time that a large deposit of palimpsests had been made accessible for further study. We are thus particularly grateful that Father Justin Sinaites, the Librarian of the Monastery, not only graced the conference with his presence, but also offered his insights into the long tradition of people who prayed and studied at the Monastery in the form of an introductory essay.

From 2011–2016, at the invitation of the Holy Monastery of St. Catherine in the Sinai, the Early Manuscripts Electronic Library, under its director Michael Phelps, conducted the Sinai Palimpsests Project, financially supported by the Arcadia Fund. 74 items of the currently known 172 palimpsested objects were first given a short codicological description by Claudia Rapp, Scholarly Director of the Sinai Palimpsests Project, with the valuable assistance, since 2014, of Giulia Rossetto. The items were then imaged with multi-spectral photography and processed using different computer-based methods. Based on the images, the texts and scripts were then identified by an international team of experts, and the results published online (www.sinaipalimpsests.org, accessible after registration).

Many of the contributions in this volume are based on Sinai material, written by scholars who participated in the Sinai Palimpsests Project. The wider context for these findings is provided by further contributions that offer insights into palimpsested manuscripts from different language traditions and other locations. Indeed, it has now become possible to study medieval manuscript depositories with palimpsested material across Jewish, Christian, and Muslim traditions.

The intensified dialogue between experts in image capture and image processing and textual scholars, with rising levels of mutual knowledge, is reflected in several contributions. The result is an ever-increasing amount of data and metadata in digital format, which needs to be archived, managed, and made accessible. Several articles also speak to this topic.

Most of the papers assembled in this volume were first presented at the conference 'New Light on Old Manuscripts. Recent Advances in Palimpsest Studies', held at the University of Vienna and the Austrian Academy of Sciences, 25 to 27 April 2018. The organizing committee for the conference also became its editors: Claudia Rapp, Giulia Rossetto, Jana Grusková, and Grigory Kessel. The international character of the conference is also reflected in the languages represented in this volume, which includes contributions in Italian, French, and German, each with an abstract in English.

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[8] For an overview of palimpsest studies in recent decades, see the contributions in Somers (ed.), *Palimpsestes et éditions de textes: les textes littéraires*.

[9] Géhin and Frøyshov, Nouvelles découvertes sinaïtiques, 182.

The volume is intended to provide a comprehensive overview of the current state of research on palimpsests, covering the entire process of research: from manuscript analysis, through image capture and image processing, to textual studies, and, finally, issues of digital display. The study of palimpsests, perhaps more so than other research fields, requires a constant dialogue between experts in all these fields, and a mutual understanding of their aims and working methods.

This is reflected in the structure of the volume, whose 30 contributions are divided into five parts.

The first part, 'Saint Catherine's Monastery and its Palimpsests', highlights the pioneering enterprise of the Sinai Palimpsests Project (SPP), which focuses on the largest collection of palimpsests in multiple language traditions to exist in a single location. This collection, at the Monastery of St. Catherine in the Sinai, includes manuscripts in languages ranging from Latin to Caucasian Albanian, with a heavy presence of Greek, but also of Syriac and Christian Palestinian Aramaic. Sinai Palimpsests Project represents the first time that such a large group of palimpsests has been studied as a whole. It has been exploring new frontiers in palimpsest studies in several ways. As a reflection of the constantly-evolving fields of image capture and image processing, it has emphasized and implemented close collaboration and interaction between textual scholars and image scientists in the process of rendering the erased texts legible. And, as a reflection of the multi-lingual collection in the Sinai, it has resulted in a number of initial comparative studies that cut across linguistic boundaries.

The study of the Sinai palimpsests is set in a broader context in the second part of the volume, 'Palimpsests and their Contexts', which presents the results of the study of important palimpsests in other locations, and indeed other religious traditions, including Judaism and Islam. What emerges here may, it is hoped, constitute the beginning of comparative studies in the creation, use, and circulation of palimpsested writing material in cross-cultural perspectives.

Individual manuscripts are the focus of the third part, 'Palimpsests and their Contents'. This part of the volume showcases erased layers that preserve precious evidence of previously-unknown texts and rarely-attested languages.

Part four, 'Imaging and Processing Methods', and part five, 'Management and Display', present the imaging and image processing techniques, as well as the digital database tools developed by the Sinai Palimpsests Project and by other palimpsest projects.

The methods applied to the study of individual palimpsests partially overlap or intersect, resulting in some repetitions in the basic explanations of the foundations of this work, which are, however, essential for the understanding of each contribution as a free-standing unit. Since the volume will be published open access and each contribution may be accessed and read independently of the others, this is not only inevitable, but indeed essential. The contributions in this volume have been generated to be read as individual pieces. The volume is most definitely not intended as a handbook to palimpsest studies, nor does it aspire to present a complete picture of the Sinai collection of palimpsests. That will have to wait until the other half of the palimpsested collection has been imaged. Instead, it is our hope that it will offer a state-of-the art point of reference for the study of palimpsests in the regions of the former Roman Empire, from Britain to the Caucasus, and including the Near East.

A PREVIEW OF THE CONTRIBUTIONS

Michael B. Phelps, Director of the Sinai Palimpsests Project (SPP), begins the section 'Saint Catherine's Monastery and its Palimpsests' by explaining the history of the Sinai Palimpsests Project and its working methods. He lays out how even in the five years of its duration the methods of image capture and image processing were adapted and refined. Looking ahead, he also points out what would be needed to tackle the more than 50% of Sinai palimpsests that have not yet been imaged and studied.

Claudia Rapp, Scholarly Director of the Sinai Palimpsests Project, pursues a different approach. Taking the entire palimpsest collection that has been imaged so far as a departure point, she offers a first overview over the patterns of the creation, dissemination, and subsequent use of erased parchment in the Levant. Comparisons with the palimpsests found in the Cairo Genizah and the Qubbat al-Khazna in Damascus, material also discussed by Ronny Vollandt and Alba Fedeli, suggest that it was primarily Christians who engaged in the erasure of texts and the regional trade in reusable, second grade writing material.

Giulia Rossetto presents a comprehensive study of the 11 texts from classical antiquity that are preserved in Greek, Syriac, and Latin in the erased layers of a total of six manuscripts in the Sinai. Eight of these classical texts have either not been known in their entirety, or preserve the earliest witness of a known text. It is strik-

ing that a large number of the erased texts are of medical nature, not only the *corpus Hippocraticum*, but also perhaps from the authors Crateuas and Antyllus, about whom very little is known. The most spectacular find is surely a previously-unknown Greek mythological text in hexameters whose surviving passages relate to the youth of the god Dionysus. A meticulous study of the regional and chronological origins of the erased scripts and the overtexts suggests a wide range of patterns for the reuse of parchment materials: time-spans between 100 and 400 years, and geographical movement either on a large or on a medium scale.

Pasquale Orsini analyses in detail the new material that Sinai Palimpsests Project has added for the study of the development of the different script styles in Greek majuscule from the middle of the 6th to the 9th centuries. The minuscule scripts of the 9th to the 11th centuries that Orsini studied can be assigned to different regional origins: Sinai-Palestine on the one hand, and Southern Italy on the other. He also draws attention to the fact that four, perhaps five of the parchment sheets whose 9th-century Greek text script was later erased were originally not part of a codex, but of a scroll, a book format that has traditionally been thought to have disappeared after the 4th century.

Some manuscripts present such rich material in their erased layers that they become the focus of individual studies. Sin. ar. NF 8 is a case in point. In addition to the medical texts mentioned above, it also contains another spectacular find, the Latin *History of Apollonius of Tyre*, accompanied by a line drawing. Contextualizing this find within the other Latin manuscript evidence at St. Catherine's, and offering further historical details from written sources and comparative manuscript material elsewhere, Michelle P. Brown argues for a strong connection between the British Isles and the Sinai in the 6th to 10th centuries, manifested not only in the travel of Latin manuscripts of Insular origin to the Sinai, but perhaps also in the presence of a Latin scriptorium at the monastery.

Sin. ar. 514, copied by Thomas of Fustat, possibly in the Sinai, around the year 900, is another manuscript that deserves a study all of its own. Grigory Kessel is able to identify in the erased layers 29 different texts in Syriac, one in Greek, and one in Arabic. These came from 19 original manuscripts, 18 in Syriac and one in Arabic, seven of them double palimpsest, with the erased texts being copied either in the 5th to 6th century or the 9th century. Buried in this manuscript, as in a catacomb, are previously unknown texts: Ephrem the Syrian, *Against the Jews*, previously considered lost, as well as a very early herbal in Syriac, in addition to earlier versions of texts only attested in later stages of their development. The manuscript is also important in that the erased text of the Epistle to the Hebrews contains a colophon dated 551/2, a rare instance of a reused manuscript with a date.

Alain Desreumaux continues the exploration of a single manuscript in the context of the exceptionally rich material in Christian Palestinian Aramaic that is preserved in the manuscripts associated with St. Catherine's, mostly in palimpsests. He identifies in the erased layers of Sin. syr. NF M56N an 'Évangile christo-palestinien palimpseste du Sinaï' that was expertly produced between the 6th and the 9th century, probably in Palestine. It contains several passages from Matthew and Mark that had not previously been attested in that language.

The Sinai Palimpsests Project has brought to light significant new material for the study of Christian Palestinian Aramaic, not only in terms of previously unknown texts or text passages, but also—by extension—by augmenting the knowledge base of the grammar, vocabulary, and morphology of that language. This is exemplified by the contribution of Christa Müller-Kessler on Sin. syr. NF M38N, which contains, *inter alia*, a quire that originally belonged to the *Codex Climaci rescriptus* now in the Green Collection in Washington, DC. As a meticulous study of the text and its language makes clear, the translation of 1 and 2 Corinthians preserved on these erased folios was made directly from the Greek, without a Syriac intermediary, perhaps even at St. Catherine's itself.

Important discoveries in the erased layers were also made in Georgian and Armenian. Bernard Outtier draws attention to the attestation of the early Georgian script typical of the 5th to 7th century (*khanmet'i*) in some Sinai palimpsests, a script that was soon superseded—which may explain its erasure, in an analogous process to the reuse of material written in Greek majuscule. Although Armenian manuscript material is quite rare at St. Catherine's, it has been possible to identify in the erased layers of Sin. syr. NF frg. 76 the earliest Armenian version of the *Life of St. Anthony*, the founder of monasticism. In general, the texts studied by Outtier reveal the liturgical needs and reading preferences typical of a monastic community.

The important discoveries in the course of Sinai Palimpsests Project in Georgian continue with the contribution by Zaza Aleksidze who did not live to see its publication and Dali Chitunashvili. They have been able to identify an early version of the Georgian collection of liturgical hymns (Ancient Iadgari), copied in the

10th century. The manuscript was commissioned by Duke Tornike Eristavi, who is also associated with three manuscripts that were donated to the newly-founded Georgian monastery on Mount Athos.

The legibility of erased text in Caucasian Albanian has been significantly enhanced by improvements in imaging techniques in the course of the Sinai Palimpsests Project, and especially the pioneering use of a transmissive light source, as Jost Gippert demonstrates in detail. Since this language is only known from erased layers in two Sinai manuscripts with overtext in Georgian, Sin. geo. NF 13 and Sin. geo. NF 55, every new piece of evidence is precious. In this instance, extensive new passages from the Gospel of John have been rendered visible, including some new words and forms previously unattested in Caucasian Albanian.

Heinz Miklas explains how images provided by Sinai Palimpsests Project enabled him to refine his long-standing research on the Glagolitic manuscripts from the Sinai and elsewhere which preserve (often in the erased layers) precious evidence for the earliest development of this script and the earliest texts of the Slavonic liturgical tradition. Of particular interest is the Latin writing found in one of three erased layers of the Medical Folia, i.e. three bifolios found inserted into the *Psalter of Demetrius* (Sin. slav. NF 3). Miklas is able to detect traces of illustrations showing the Archangel Michael and the Holy Virgin. All of this evidence points to the Sinai as a place of the convergence of languages and liturgical traditions, in this instance of Latin and Slavonic, comparable in importance only to the region of Dalmatia.

The next part, 'Palimpsests and their Contexts', offers a broader perspective and comparative materials, setting the Sinai palimpsests within a larger cultural context. The largest depositories of medieval manuscripts in the cultural region of the Mediterranean are the Cairo Genizah with its largely documentary Jewish texts, and the Qubbat al-Khazna in Damascus, a Muslim cache of manuscript material. These offer many points of comparison, especially with regard to the use of palimpsests. Ronny Vollandt traces the history of scholarship on these depositories, explains the cultural attitudes towards the reuse of erased writing in Judaism and Islam, and then concludes by presenting statistical comparisons regarding the texts, religious outlook, and date of the erased material. His findings suggest that erased texts of Christian origin were recycled to become the writing support of choice for Jewish and Muslim scribes. For reuse for Christian overtexts, it was largely writing in Christian Palestinian Aramaic that was erased after that language ceased to be in use.

The erasure and reuse of writing materials among Muslims also comes to the fore in Alba Fedeli's extensive exploration of Qur'anic palimpsests in their cultural context. Particularly striking is the application of Qur'anic text over erased Qur'anic text that had been copied only a few decades earlier. The locations where Arabic palimpsests have been found—the Qubbat al-Khazna in Damascus, the depository in the mosque in Ṣanʿāʾ in Yemen, and a further depository in the Mosque of ʿAmr in Fustat, along with the Sinai—in conjunction with the nature and languages of the other erased texts used for creating a new manuscript can offer new insights into the interaction between languages and religions as well as local archiving practices.

André Binggeli presents a meticulous investigation of the practices of palimpsestation in Constantinople in the first half of the 15th century, on the basis of manuscripts from the Patriarchal Library in Istanbul. He shows that the erasure of texts seems to follow certain patterns depending on the availability of superfluous material in conjunction with the needs of the church or monastery for which a new manuscript was produced, while the format and arrangement of the reused palimpsested folios was dictated by the state of preservation of the original writing support.

Editorial challenges of particular complexity are encountered when working on erased musical annotations, where not only letter shapes, but also small signs such as dots carry significance and meaning. Andreas Janke lays these out in a systematic fashion, and then presents a list of 54 medieval manuscripts with erased musical notation. His findings suggest that, more often than not, in the musical manuscripts the new overtext stayed within the same genre as the erased undertext, replacing older musical notation systems or recording more recent compositions.

The four contributions in the section 'Palimpsests and their Contents' focus on individual manuscripts whose erased layers have in recent years been the subject of thorough study, in order to reveal previously-unknown texts or to augment our knowledge of poorly-attested languages.

Jana Grusková and Giuseppe De Gregorio present the most recent results of research on palimpsests of the Austrian National Library that have, *inter alia*, brought to light some remarkable and previously-unknown texts whose distinct palaeographical features are analyzed: folios of an 11th-century manuscript containing historical information about the Gothic advance in the Roman provinces on the Balkans, probably from the

Scythica of the 3rd-century author Dexippus; a fragment of Eusebius' *Chronicle* that was perhaps copied in 10th-century Southern Italy; fragments of Herodian's work on Greek accentuation; and an early and independent textual witness of the *Basilica*, a 9th-century Byzantine law book.

The study of the *Basilica* continues with a contribution from the legal historian Bernard H. Stolte. He points out that the oldest textual witnesses of (parts of) this legal compilation are found in palimpsests of the 10th to the 13th centuries. The textual tradition of the *Basilica* is complex and fluid, especially with regard to its rendering of Justinianic material that was originally written in Latin. The Vienna palimpsest (Vienna, Austrian National Library, Cod. suppl. gr. 200) is particularly valuable as it preserves text passages that are close to these 6th-century origins.

In the same vein of meticulous philological analysis, Felix Albrecht and Chiara Faraggiana di Sarzana offer their observations on a palimpsest manuscript in Turin that was damaged in a fire (*Codex Taurinensis*, Biblioteca Nazionale Universitaria, C.V.25). The well-known 15th-century copyist Georgios Baiophoros used for his copy of grammatical works of Manuel Moschopoulos recycled parchment that contained Old Testament writings in a 7th-century majuscule. The comparison with other versions of the relevant passages of the *Libri sapientiales* suggests that, although Baiophoros was active in Constantinople, the erased text had its origin in the East of the Byzantine empire.

Gothic was, like Christian Palestinian Aramaic and Caucasian Albanian, a language that became obsolete and whose traces are largely found in erased layers of palimpsested folios. The article by Carla Falluomini, Simon Brenner, and Bernadette Frühmann on the Bologna Gothic palimpsest (Bologna, Archivio della Fabbriceria di San Petronio, Cart. 716/1, n° 1, *olim* 353) exemplifies the kind of collaboration that is needed for this kind of poorly-preserved material. In this case, collaboration between philologists and palaeographers on the one hand, and image scientists on the other, was further enhanced through non-invasive chemical analysis of the ink. Enhancing the legibility of what was probably a liturgical text in use by the Arian Ostrogoths of Italy in the first half of the 6th-century has resulted in new lexicographical insights that may also shed further light on the cultural and linguistic interactions between Ostrogoths and Slavs in the process of their migrations.

The second part of the volume develops further the importance of the interaction between textual scholars and image scientists already touched upon in the contributions of Miklas, Gippert and Falluomini, Brenner, and Frühmann. The digital medium provides the basis for the three steps involved in the modern study of palimpsests: image capture, computer-based image processing, and the visualization of the digital images, including their access online.

Damianos Kasotakis, Head of Imaging of the Sinai Palimpsests Project, offers insights into the camera system that was used in the project, including the transmissive light source that was developed over the course of the project. After the naked-eye examination of a manuscript by a manuscript scholar prior to imaging, it is the camera operators who are the first to see the digital images as they appear on their screens during image capture. This may lead to important discoveries, as in the case of the illustrated herbal in Sin. ar. NF 8, which laid the foundation for subsequent research.

Keith T. Knox explains the image processing techniques that were developed in the course of several projects, as each posed new and different challenges. For the Sinai Palimpsests Project, Knox developed the raking light algorithms and the transmission ratio algorithm. In this context, too, it is only the constant dialogue between the study of the physical object and the study of its scripts and texts through image capture and image processing that brings advances in technology and scholarship.

Roger L. Easton, Jr. and David Kelbe go into greater detail to explain the basis in visual perception and light emission for multispectral imaging. Taking the camera system used in the Sinai Palimpsests Project as an example, they describe statistical processing as one of the methods used in the project.

The chemical analysis of iron gall ink through non-invasive photometric methods is the topic of Leif Glaser's contribution. Here, too, an understanding of the material object, i.e. the pigments of ink, is an essential foundation for the work of textual scholars. As with all the innovative methods described in the contributions to this volume, these methods are evolving and being refined with every new historical object studied. Collecting and sharing all available data and metadata will ensure the advancement of these methods.

Irmgard Schuler's contribution deals with how digital imaging and image processing methods as well as other methods of photographic analysis can offer new insights for the purposes of conservation and restoration of ancient texts and their writing supports. Based on case studies from the Vatican Library, she demonstrates the possibilities of a holistic approach in the recovery of lost writing.

Next follows a multi-authored article by Naima Afif, Siam Bhayro, Peter E. Pormann, William I. Sellers, and Natalia Smelova that introduces GalenQT, a new software tool developed for image processing at the University of Manchester. Impressive results using this tool, in conjunction with philological methods, have been achieved in recovering lost text of the Syriac version of Galen, *On Simple Drugs*.

The management and display of digital data is the topic of the remaining contributions. Doug Emery lays out how data management systems are developed for specific projects and then adapted for each new context. In this instance, the data modelling and data management software that he developed for the *Archimedes Palimpsest* was incrementally expanded in subsequent projects, culminating in the large volume of images and metadata generated by the Sinai Palimpsests Project for which he designed the KatIkon software tool.

Taking one of the *membra disiecta* of the Sinai, the so-called *Syriac Galen Palimpsest*, as an example, Michael B. Toth lays out the many steps involved in the study of a single palimpsest manuscript, explaining the imaging and image processing methods employed in this particular project, which included the use of the synchrotron—thus complementing the presentation of the GalenQT software above.

Several contributions highlight the importance of gathering as much digital data as possible and archiving it for future developments in scholarship, as does Glaser for images and measurements. In the same spirit, Gregory Heyworth advocates, from the point of view of the scholar tasked with creating a text edition based on a lacunose manuscript, for the rigorous application and transparency of metadata standards.

The final contribution returns to the palimpsest work in the Vatican Library. While Schuler demonstrated how the process of imaging can benefit from dialogue with conservators, András Németh emphasizes the need to explore and refine digital tools for the presentation of erased layers to a large audience of experts and non-experts alike. The Mirador software developed at Stanford was further developed and adapted at the Vatican Library in response to challenges posed by individual manuscripts. Bearing in mind the didactic needs in the presentation of palimpsests, Németh advocates the adoption of unambiguous terminology and clear frames of reference for each palimpsest layer and each codex of origin.

Palimpsest studies in the 21st century are truly interdisciplinary, bringing together cutting-edge developments in digital imaging, computer-based processing, and online data management, along with the traditional skills of palaeography and expertise in the languages and written records of bygone cultures. It is our hope that this volume will demonstrate how such dialogue can stimulate further research. Moreover, the library at St. Catherine's, where manuscripts from all the corners of medieval Christendom have been preserved for centuries, offers an ideal test case for a holistic approach that goes beyond the study of a single language tradition. Only on this basis can we hope to understand the patterns of creating and using palimpsests, and gain a deeper understanding of the texts and languages that have been obscured as a result. The process of 'piercing the mists of time', to borrow the fortuitous phrase of Father Justin Sinaites, has only just begun.

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Hieromonk Justin of Sinai

The Sinai Palimpsests: Piercing the Mists of Time

An international conference was held at the University of Vienna from 25–27 April, 2018, with the title, *New Light on Old Manuscripts: Recent Advances in Palimpsest Studies.* The conference was organized to celebrate the successful conclusion of the Sinai Palimpsests Project, and indeed, there was much to celebrate. But the conference was not limited to the Sinai palimpsests only. Other important imaging projects are underway. It is by sharing our expertise, as scientists and as scholars, that we will continue to make progress, in both the technology, and in our understanding of these texts.

The Sinai monastery was a centre of scribal activity. But the remoteness of the site meant that it was often impossible to obtain a supply of fresh parchment. The solution was to take an older manuscript, erase the text, and use the valuable parchment a second time. This accounts for the high proportion of palimpsests at Sinai. A number of these underlying texts were known from the 19th century, identified from words and phrases that protrude into the margins. But the recovery of these texts was very difficult. It seemed they had been lost forever.

The scientists working on the *Archimedes Palimpsest* made important breakthroughs in multispectral imaging by combining their expertise in the fields of lens and camera design, lighting, and image processing.[1] It was courageous of this same team to accept the invitation to work with the palimpsests at Sinai. This required taking skills that had been acquired in working with one manuscript, and applying them to an entire collection.

We began the Sinai Palimpsests Project in 2011. The technology continued to advance through the course of the project. Also, we became better at detecting palimpsest text, so the number of palimpsests at Sinai also continued to expand. Thus, the photography of palimpsests at Sinai is far from over. But the results of the Sinai Palimpsests Project are startling: 6,800 pages imaged from 74 manuscripts, revealing 307 erased texts in 11 languages.

The conference provided the opportunity for scientists and scholars to speak about their research on the Sinai palimpsests, and about palimpsests from other collections. Many scholars were sharing the results of their research for the first time. The publication of the contributions given there is certain to be an important volume, making the proceedings of the conference available to a wider audience.

We are grateful to the Arcadia Fund, which generously supported the Sinai Palimpsests Project. The monastery's participation is due to the wisdom and foresight of Archbishop Damianos, who is committed to both protecting and sharing the treasures and the spiritual heritage of the Sinai monastery. Michael Phelps, of the Early Manuscripts Electronic Library, heroically coordinated the many people and institutions involved. And we are all grateful to Professor Claudia Rapp for her work at Sinai, creating the catalogue entries for the palimpsests, and overseeing the many scholars working on the project. Her appreciation of the significance of the Sinai Palimpsests Project, and of other work being done in this field, resulted in the international conference. We are grateful to all of these, to all who participated in this project, and to all who were present at the international conference.

THE FOURTH CENTURY

We have historical records for Sinai dating from the 4th century. In the year 383, Egeria travelled to Jerusalem, and attended services in the Church of the Holy Sepulchre. From there, she continued on to Sinai, a journey of twenty-two staging posts, as she travelled along the Mediterranean, down the west coast of the Sinai peninsula, and then east to Pharan and Mount Sinai. She ascended to the peak from the north side, where a venerable hieromonk celebrated the Divine Liturgy for the assembled monks and pilgrims. In the basin below the summit,

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[1] Netz *et al*. (eds.), *The Archimedes Palimpsest*.

she venerated the cave of the Prophet Elias, where she was diligent to read the appropriate scriptures from the Books of the Kings. The monks brought fruits from their gardens for the pilgrims, calling them *eulogiae,* a Greek word, 'blessings'. Only then did she descend to the opposite valley, and she writes, 'there are a great number of monastic cells of holy men there and a church in the place where the Bush stands. The Bush is alive to this day and sends out green shoots'.[2]

If the monks remain fairly opaque in Egeria's pilgrim account, we learn their names and details of their lives in the *Report of the Forty Martyrs of Sinai and Raithou,* by Ammonius of Canopus. A monk called Moses lived at the traditional Elim, an oasis near the coast of the Red Sea. The children of Israel had encamped at this location where Exodus 15:27 mentions twelve springs of water and 70 palm trees. Ammonius reports that he lived for 73 years in a cave in a hillside, practicing an austere ascetic regime. Refusing to eat bread, he contented himself with 'a few dates for nourishment, along with water to drink, and he made his clothes from palm fibres. He cherished tranquility more than anyone else, and kindly received anyone who came to him with questions about their thoughts'. From the many miracles that God wrought through him, all the inhabitants of Pharan had come to believe in the Holy Trinity, and received Baptism.[3]

Lest a diet of dates sound exotic, we recall here the words of Charles Doughty, who travelled in Arabia in 1877–1878, and witnessed what it was to subsist on such a diet.

> The Arabians inhabit a land of dearth and hunger, and there is no worse food than the date, which they must eat in their few irrigated valleys. This fruit is overheating and inwardly fretting under a sultry climate: too much of cloying sweet, not ministering enough of brawn and bone; and therefore all the date-eaters are of a certain wearish visage … Where the date is eaten alone, as they themselves say, human nature decays, and they drink a lukewarm ground-water, which is seldom wholesome in these parts of the world.[4]

In the 4th century, there dwelt ascetics at Sinai and Raithou who were established in virtue, who had attained to the pinnacles of prayer and spiritual graces.

THE SIXTH AND SEVENTH CENTURIES

We also have historical records for Sinai from the 6th and 7th century. The Piacenza Pilgrim visited Sinai in the early 550s and explains: 'At the foot of the mountain is that spring where Moses saw the sign of the Burning Bush and at which he gave water to his sheep. The spring is enclosed within a monastery, and the monastery is surrounded by fortified walls. In it are three elders who are learned in several languages—I mean Latin and Greek, Syriac, Egyptian, and Bessan—as well as many translators of individual languages'.[5]

Procopius, in his work *On Buildings,* mentions that at the base of the mountain where Moses received the Laws from God, the Emperor Justinian built a very strong fortress, with a church dedicated to the Mother of God, to enable the anchorites who dwelt there 'to pass their lives therein praying and holding services'.[6] Many scholars feel that Procopius' *On Buildings* was completed in the year 554/5, though others have argued for the date 559/60.[7]

This reference is corroborated by inscriptions carved into the beams of the basilica. The seventh beam, counting from the west end, bears the following inscription:

† Ὑπὲρ μνήμης κ(αὶ) ἀναπαύσεως τῆς γεναμένης ἡμῶν βασιλίδος Θεοδώρας †
† For the memory and repose of our late Empress Theodora †

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[2] Egeria, *Travelogue* I–IX (with Abridgements by Peter the Deacon), translated by Caner, *History and Hagiography from the Late Antique Sinai,* 223.

[3] Ammonius, *Report* 13, translated by Caner, *History and Hagiography from the Late Antique Sinai*, 156. See also 141–149 on the different versions of this text in other languages.

[4] Doughty, *Travels in Arabia Deserta,* 190.

[5] Piacenza Pilgrim, *Travelogue* 33–42: Jerusalem to Mount Sinai and Clysma, translated by Caner, *History and Hagiography from Late Antique Sinai,* 257

[6] Procopius, *On Buildings,* Book 5, Chapter 8.5.

[7] Cameron, *Procopius and the Sixth Century*, 9–11.

The eighth beam bears the inscription:

† Ὑπὲρ σωτηρίας τοῦ εὐσεβ(εστάτου) ἡμῶν βασιλέως Ἰουστινιανοῦ †
† For the salvation of our most pious Emperor Justinian †

The inscription on the one beam commemorates the Empress Theodora as having passed away, while the inscription on the other commemorates the Emperor Justinian as still living. We know that the Empress Theodora died in the year 548, while the Emperor Justinian died in 565.[8]

Rusticiana, a Roman aristocrat from Constantinople, visited Sinai towards the end of the 6th century, and Pope Gregory, who had met her when he was the papal representative to Constantinople, wrote to her in August, 594, mentioning her pilgrimage: 'Believe me, I would have liked to have gone with you, but certainly not to have returned with you'.[9] He wrote to the Abbot John of Sinai on September 1, 600, asking for his holy prayers. He sent him fifteen sheets, thirty blankets, fifteen beds, and funds for the purchase and transport of mattresses, to supply the infirmary of the monastery.

The most important book composed at Sinai is *The Ladder of Divine Ascent,* written by John, Abbot of Sinai, who is known as John Climacus, or St. John of the Ladder. He lived in the latter 6th and early 7th century. Taking the vision of the ladder that Jacob saw extending from earth to heaven as a paradigm of the spiritual life, he describes thirty steps as rungs on the ladder of spiritual ascent. The book is a compendium of the wisdom of the Desert Fathers. St. John is a shrewd judge of human nature, and his admonitions, born of personal experience, have been treasured by both monks and laymen ever since.

We do not know where he was born. We do know that he was only sixteen when he set out on the long and arduous trek to Sinai. He would have walked for many days south along the Red Sea, across vast expanses of sand and gravel, and then turned east, following narrow, rock-strewn valleys, the mountains around him soaring higher and higher, until he came at last to Sinai, the God-trodden mountain. As he followed literally in the footsteps of the Exodus, he set the example of the children of Israel before him. Love for God transcended love for everything in this world. St. John explains: 'Love of God is the foundation of ξενιτεία'.[10] The word ξενιτεία can be translated in two ways. It can mean 'sojourn in a foreign land', 'being a stranger, a wanderer', in a word, 'exile', used metaphorically of the saints on earth. It can also mean 'isolation from the world' as a spiritual person, in a word, 'solitude'.

The construction of the great fortress at Sinai did not supplant the earlier tradition of monks living in very small communities and hermits living in solitude throughout the area, and it is to these that St. John turned, becoming the disciple of Abba Martyrius. The monks gathered on Sundays and feast days for the celebration of the Eucharist. But the greater part of his time would have been spent in solitary prayer. St. John writes: 'Exile is separation from everything in order to keep the mind (λογισμόν) inseparable from God.' (Step 3:3)[11] Through prayer and the practice of the virtues, and above all, through the grace of God, the νοῦς is renewed, and becomes illumined. The word νοῦς can be translated 'mind', or 'intellect', or, more imaginatively, 'the eye of the mind', or even 'the eye of the heart'. It is the apprehending perception by which we instinctively grasp spiritual insights. The νοῦς becomes the vigilant guardian of our thoughts. St. John writes with profound insight about ἡσυχία, 'quietude', spiritual vigilance, the recitation of the Jesus Prayer. Here we recognise the hesychast prayer of the heart, developed later in Constantinople and on Mount Athos, but already present at Sinai in the 6th century.

John Moschus (ca. 550–634), a monk of Palestine, travelled through the Sinai in the late 6th and early 7th centuries, recording the lives of saintly elders in his *Spiritual Meadow.* He witnessed the destruction of Jerusalem by the Persians in 614, and lived to see their defeat by the Emperor Heraclius in 627. Two years later, the Emperor travelled to Jerusalem in person to restore the True Cross to the Church of the Holy Sepulchre. John Moschus's disciple, Sophronius, became the Patriarch of Jerusalem in 634, and it was he, in April, 637, who surrendered the city to Caliph Umar, marking the Muslim conquest of the city.

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[8] Sevcenko, The Early Period of the Sinai Monastery, 262.
[9] Gregory the Great, Letter IV.44, *To Rusticiana*, translated by Caner, *History and Hagiography from Late Antique Sinai,* 263–264.
[10] St. John Climacus, *Ladder of Divine Ascent*, 216, Step 26 Summary:3.
[11] St. John Climacus, *Ladder of Divine Ascent*, 194, Step 3:3, 63. Author's translation.

A generation after John Moschus, Anastasius of Sinai followed him in recording the lives of saintly elders. He describes Sinai as a place of austerity. Conditions there could be dangerous. But it was also a place where there dwelt holy anchorites. It was a place where remote chapels would suddenly become luminous in the presence of holy angels.[12] He also wrote a series of *Questions and Answers.* These deal with practical matters that one encounters in trying to live the Christian life. Several of his answers show Christians trying to cope with the new political situation of Arab rule.[13]

The early 9th century *Chronicle*, by the monk Theophanes the Confessor, contains entries describing the Arab invasion of Palestine, which included the Sinai peninsula, in 630–632.[14]

Eutychius became Chalcedonian Patriarch of Alexandria in 933. He composed a universal history, the first to have been written in Arabic. He describes a tower that existed at the place of the Burning Bush, where monks could hide in case of an attack, but it was not sufficient to ensure their safety. A delegation of monks from Sinai appeared before the Roman emperor Justinian with the following request: 'We ask you, O King, to build a monastery for us so that we can be protected in it'. The emperor granted their request, and ordered the governor of Egypt to assist them with funds, men, and supplies. One hundred men from the Balkans, and another one hundred from Alexandria, were also commanded to travel to Sinai, together with their wives and children, to live there and guard the monastery. They converted to Islam at the time of ʿAbd al-Malik ibn Marwan, the Umayyad caliph from 685–705.[15]

THE EIGHTH, NINTH, AND TENTH CENTURIES

We yearn to know what happened at Sinai in the 8th, 9th, and 10th centuries, but here our historians desert us. This is the dark period of Sinai's history. Pharan, for example, was the centre of ecclesiastical, civilian, and military authority on the Sinai until the Arab conquests, then it vanishes from record.[16] Today, all of its historical buildings lie in ruins. It is the same with the monastery of Raithou, an imposing complex in the 6th century, built of white limestone. Its walls survive to a height of one or two metres, enough to allow us to reconstruct the layout of the monastery. Who were the last monks of Raithou? When did they leave? We do not know. These ancient centres now only survive in the official title of the bishop, who is Archbishop of Sinai, Pharan, and Raithou.

In the absence of historical records, we must turn to the surviving material evidence for insights into the history of Sinai at that time.

In 1935, the Colt expedition recovered three papyri in the ruins of Nessana in the Negev desert. The first lists the purchases and receipts of a caravan that operated between Nessana and Mount Sinai. The two others are letters in the same hand, requesting guides to Mount Sinai. Both were issued by a provincial governor named Abu Rashid to a Nessana administrator named George. They are dated to the 12th indiction, suggesting a date of 683/4. These provide evidence for continued travel to Mount Sinai fifty years after the Muslim conquest.[17]

The numerous inscriptions carved on rock through the Sinai desert are further evidence that this traffic of wayfarers and pilgrims continued under Arab rule.[18]

Additional material evidence for Sinai after the 7th century is provided by icons. St. Catherine's Monastery possesses an unparalleled collection, the most important of which have been dated to the 6th century. They are painted in the encaustic technique, and based on the heritage of classical forms.

The emperors of Constantinople pursued a policy of iconoclasm from 726–843. Sinai, already outside the Byzantine empire, was not affected by this, and a number of icons can be dated to the time of iconoclasm. These icons show a development away from Hellenistic naturalism, and the emergence of a style that is more decorative, more linear, and thus more abstract.

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[12] Caner, *History and Hagiography*, 174–175.
[13] Anastasios of Sinai, *Questions and Answers*, 173.
[14] Theophanes, *Chronographia*, AM 6121, tr. Mango, 462.
[15] Eutychios of Alexandria (Saʿīd ibn Baṭrīq), Annals: On Justinian's Constructions at Mount Sinai, tr. Caner, *History and Hagiography*, 280–282.
[16] Caner, *History and Hagiography*, 15.
[17] Caner, *History and Hagiography*, 266–267.
[18] Dahari, *Monastic Settlements in South Sinai*, 164.

One of the most significant is a panel icon depicting the Crucifixion. It has been dated to the 8th century on the basis of its many similarities with a fresco at Santa Maria Antiqua in Rome that can be dated to 741–752. And yet, it also has important differences. Earlier icons invariably portray Christ before death, with his eyes open. The Sinai icon is the earliest known to depict Christ with his eyes closed and bearing the crown of thorns, features that serve to emphasize his humanity. The importance of depicting the reality of Christ's death had earlier been noted by Anastasius of Sinai, in his *Hodegos* ('Guide'), written in the 680s.[19] This, and several stylistic details, make it possible that the icon was painted at Sinai.

As Kurt Weitzmann observes:

> The Arab conquest in the seventh century neither interrupted the flow of icons to Sinai nor prevented their production at Sinai itself. But it did apparently stop the influx from Constantinople and, if we are not mistaken, the majority of icons here attributed to the seventh and eighth centuries came from regions that were at that time already under Muslim domination.[20]

But it is the manuscripts that provide the most abundant evidence for Sinai at this time. The Old Collection has 201 manuscripts that have been dated from the 8th through the 10th centuries. They are in Greek, Syriac, Arabic, Georgian, and Latin.

The number of these early manuscripts was considerably increased with what are collectively known as the New Finds. These are the dilapidated texts that had been set to one side when the manuscripts were stored in the tower of St. George. They were recovered in 1975, in the course of repairs to the tower. Few of them are complete, but they have proved to be of the greatest interest to scholars because of their antiquity.

And to these manuscripts have now been added the palimpsest texts recovered through multispectral imaging. This could be considered the last frontier of the Sinai library.

GREEK

From the 4th century, Sinai was a part of the Holy Land, the far reaches of the Holy Land. Pilgrims to Jerusalem who had the time, the means, and the stamina, would continue on to Sinai. And the monks of Sinai looked to Jerusalem as their spiritual centre. As such, Sinai was also a part of the Greek speaking world. The community at Sinai has been predominantly Greek throughout its history. Of the 201 manuscripts in the Old Collection dating from the 8th, 9th, and 10th century, 98 are in Greek.

Greek letters flourished in Palestine in the 7th and 8th centuries, with the contributions made by St. John Damascene, Andrew the Jerusalemite (who became bishop of Crete), Cosmas of Maiuma, Stephen the Sabaite, George Syncellus, Michael Syncellus, and Theodore and Theophanes the Graptoi.[21] The Sinai palimpsests are evidence that Sinai was an intrinsic part of this flourishing of Greek letters in the 7th and 8th centuries. These manuscripts speak of continuity at Sinai after the 7th century, as Greek remained the language of conversation, study, and prayer.

Leontius of Damascus composed a life of Stephen the Sabaite (who died in 794) shortly after 807. In it, we catch a glimpse of conditions in Palestine at that time. He mentions two women who regularly travelled unaccompanied to Jerusalem, from where they would continue on to Mount Sinai.[22] But such tranquility was not to last. Anarchy broke out following the death of Harun al-Rashid (809–813). Monasteries were sacked, and many of these scholars left for Constantinople. Michael Syncellus and his two disciples Theodore and Theophanes became disciples of Theodore the Studite, and assisted him in his refutation of iconoclasm. Other refugees headed south where they found asylum in the desert and the inaccessible mountains of Sinai.[23] Sinai, more remote, was distant from the turmoil in Palestine. Greek letters continued to flourish there in the 9th century, and later.

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[19] *PG* 89.197.B9–C10. See Belting and Belting-Ihm, Das Kreuzbild im Hodegos des Anastasios Sinaites, 30–39.

[20] Weitzmann, *The Monastery of Saint Catherine at Mount Sinai*, 5.

[21] Mango, Greek Culture in Palestine after the Arab Conquest, 149–150.

[22] De S. Stephano Sabaita, Thaumaturgo Monacho in Laura S. Sabæ prope Hierosolymam (ch. 133), 557.

[23] Blake, Greek Literature in Palestine in the Eighth Century, 373.

Of special interest are the early and significant Greek medical texts copied in this period that have been recovered from the Sinai palimpsests. We recall the provisions for the monastery infirmary that Pope Gregory sent to the Abbot John at the beginning of the 7th century. Later in that same century, Anastasius of Sinai was responsible for the νοσοκομεῖον, the 'sick bay'.[24]

When Peter Grossmann was carrying out excavations at Pharan, in the spring of 1987, he uncovered the foundations of a church in the form of a small three-aisled basilica. An adjoining building seemed to be a kitchen. The reason for this juxtaposition became clear when he unearthed an important Greek inscription: the church was dedicated to Sts. Cosmas and Damian, the Unmercenary Healers. It was a church where prayers could be said for the sick, and where they could also have special foods prepared, to sustain them in their illness, and to aid them in their recovery.[25]

SYRIAC

Classical Syriac was the language spoken in upper Mesopotamia. In the Late Antique world, Syriac-speaking villages stretched from the Mediterranean to the foothills of the Zagros, and from Antioch to Ctesiphon, the Persian capital. When the Piacenza Pilgrim visited Sinai in the early 550s, he found monks fluent in Syriac. The Old Collection at Sinai contains 26 manuscripts in Syriac written in the 8th, 9th, and 10th centuries.

Many important works of Greek philosophy, literature, and medicine were translated from Greek into Syriac. A leaf of the Sinai palimpsests contains text from Galen's treatise *On Simple Drugs,* translated in the 6th century by Sergius of Rēš ʿAynā.[26] Translations were also made from Syriac into Greek. Patrikios and Abramios, monks of the Monastery of Mar Saba, near Jerusalem, translated the *Ascetical Homilies of St. Isaac the Syrian* at the end of the 8th or beginning of the 9th century.[27] Sinai has a manuscript of the *Ascetical Homilies* in Syriac dated to the 9th century, showing the type of text from which they would have made their translation (Sin. syr. 24).

CHRISTIAN PALESTINIAN ARAMAIC

Numerous Sinai palimpsests preserve texts written in Christian Palestinian Aramaic, the language of Western Aramaic speaking Christians in the Levant. CPA NF frg. 12 contains text from the Psalms in Christian Palestinian Aramaic, dating from the 6th to the 8th century, with an overtext also of the Psalms in the same language, dating from the 9th or 10th century. The upper text also has Greek annotations, written in an inclined majuscule.

ARABIC

Syria, Palestine, and Egypt came under Arab rule in the early 7th century. By the 8th century, Christians were expressing themselves in Arabic, combining engagement with the Islamic present and loyalty to their own past.[28] The oldest scribal signature in the Sinai library is found in Sin. gr. 32 (*Diktyon* 58407), an 8th-century manuscript of the Psalms and Odes, concluding with the Beatitudes. Having written the entire manuscript in a confident majuscule Greek, the scribe added his own name in Arabic. He wrote: 'May God help you, my brother, and give you understanding. Remember me, my brother, for the sake of God', and below, 'The Psalter has been written in the place of God, Mount Sinai, by the sinner Michael, the disciple of Abba Philotheus'.

Sin. gr. NF MG 2 (*Diktyon* 61040) contains the Epistles of St. Paul, written in parallel Greek and Arabic. It is a palimpsest, with the underlying texts in Greek. Rubrics for readings from the Epistles on feast days were included by the original scribe, and other rubrics for readings during Great Lent were added in a second hand. The manuscript points to a time when there was a need for both languages.

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[24] Anastasios of Sinai, *Questions and Answers*, 10.
[25] Grossmann, *Ἡ Ἀρχαία Πόλη Φαράν*, 83
[26] Kessel, Membra disjecta sinaitica I, 469.
[27] *The Ascetical Homilies of Saint Isaac the Syrian,* lxxxv.
[28] Brown, The Great Transition.

A colophon in Sin. ar. 151, containing the text of the Acts and the Epistles, gives the name of the scribe, Bishr ibn as-Sirri, who translated the texts from the Syriac, completing the work in Damascus in the year AD 867.[29] Colophons such as this allow us to identify manuscripts that reached Sinai from Palestine and Syria.

GEORGIAN

There is evidence for Georgian monks at Sinai as early as the 6th century, but this reached a zenith in the 10th century. Georgian scribes copied out manuscripts of the Scriptures, lectionaries, and other liturgical books, as well as lives of the saints, homilies, and ascetical writings. Some of these were important translations made at Sinai. There are seven Georgian manuscripts in the Old Collection dating from the 8th and 9th centuries, and no fewer than thirty-four dating from the 10th century.

Sin. geo. NF 19 is a manuscript of the hymnographic collection known as the *Iadgari*, written in 980. It is a palimpsest, with underlying texts in Greek and CPA. Some of the folia are made of smaller patches of parchment sewn together to make up the leaf, and in the colophon, the scribe Iovane complains about having to use 'this inferior and badly-sewn parchment'.[30]

LATIN

The Old Collection at Sinai contains a Latin Psalter written in the 10th century (catalogued as Sin. slav. 5). A number of aspects of the orthography, punctuation, and contractions are rather unusual in Latin manuscripts. But they would be natural to one versed in Greek and Syriac scribal practices. All of this points to a Latin writing centre in the East, where old Latin traditions survived and new ones were occasionally introduced.[31] Such a centre could have been in Jerusalem, or in one of the outlying areas.

To this evidence has now been added the Latin texts recovered from the Sinai palimpsests. The layers in a palimpsest may be considered as archaeological strata, allowing a more precise identification of time and place. It is our hope that this cumulative evidence will allow us to better understand not only the preservation, but also the production of manuscripts at Sinai.

THE FARTHEST REACHES OF CHRISTENDOM

Three palimpsest manuscripts reached Sinai from the very perimeters of the Christian world. Sin. geo. NF 13 + Sin. geo. NF 55 is a manuscript with various ascetical and hagiographical texts, written by a scribe named Mikael in the 10th or 11th century. The underlying text is in Caucasian Albanian, an ancient language once spoken in the Caucasus to the east of Georgia, in what is today Azerbaijan. Before the recovery of this text, the language had only survived in a few inscriptions carved on stone, and in one Armenian manuscript that listed the letters of the alphabet.

Sin. gr. NF M 90 (*Diktyon* 60917) is an *Horologion*, a 'Book of Hours', dated to the 13th century. It is a palimpsest, with the underlying text in Ethiopian.

Sin. ar. NF 8+Sin. ar. NF 27+Sin. ar. NF 28 is a manuscript of the Gospels written most likely in the second half of the 8th century, now broken up into three parts. It has underlying texts in Greek, Latin, Syriac and Arabic. A decorative initial is faintly visible on one leaf, and Latin can be read in the margin below. Multispectral imaging allows us to see the text more clearly. Michelle Brown in her contribution to the Sinai Palimpsests website has identified this as an Insular hand, a style of writing developed in Ireland that spread to England, where it flourished between 600 and 850. This was the age of Aidan and Cuthbert and Bede, the time of an unusual flowering of monasticism in England.

Azerbaijan, Ethiopia, the British Isles—these were the farthest reaches of Christendom in the 8th, 9th, and 10th centuries. Traversing vast distances at that time was unimaginably difficult, and scholars have assumed a great deal of insularity. And yet, manuscripts from these remote areas reached Sinai. They show us that monks

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[29] Griffith, Catalogue Entry 35. Arabic Epistles and Acts, 62.

[30] Aleksidze *et al.*, *Catalogue of Georgian Manuscripts Discovered in 1975 at St. Catherine's Monastery on Mount Sinai*, 391–393.

[31] Lowe, An Unknown Latin Psalter on Mount Sinai, 197.

and pilgrims continued to come to Sinai, attracted by its austerity, its Biblical associations, and its reputation as an established centre of monasticism.

THE SPIRITUAL HERITAGE

We have two important monastic treatises from Sinai, composed during the time we have been considering. They were included in the *Philokalia,* a collection of texts on prayer compiled by Nikodemus of the Holy Mountain and Macarius of Corinth, first published in Venice in 1782. Hesychius the Priest, who lived around the 8th and 9th centuries, was abbot of the Monastery of the Burning Bush. He wrote an ascetic treatise, *On Watchfulness and Holiness*, in which he stressed the central importance of inner attentiveness, the guarding of the heart, and the unceasing invocation of Jesus Christ. He writes: 'Just as a man blind from birth does not see the sun's light, so one who fails to pursue watchfulness does not see the rich radiance of divine grace'.[32]

Philotheus of Sinai is known to us only from his work, *Forty Texts on Watchfulness.* He lived in perhaps the 9th or 10th century. In the twenty-third logion we read:

> Πάσῃ οὖν φυλακῇ τὴν καρδίαν ἡμῶν πάσῃ ὥρᾳ καὶ τὸ ἀκαριαῖον γοῦν τηρήσωμεν ἐκ λογισμῶν ἀχλυούντων τὸ ψυχικὸν ἔσοπτρον, ἐν ᾧ δὴ τυποῦσθαι καὶ φωτεινογραφεῖσθαι Ἰησοῦς Χριστὸς πέφυκεν, ἡ τοῦ Θεοῦ Πατρὸς σοφία καὶ δύναμις, καὶ ἔνδον καρδίας ἅπαυστα τῶν οὐρανῶν τὴν βασιλείαν ζητήσωμεν, τόν τε κόκκον, καὶ τὸν μαργαρίτην, καὶ τὴν ζύμην· καὶ τἆλλα πάντα μυστικῶς εὑρήσομεν ἔνδον ἡμῶν αὐτῶν, εἴγε τὸ ὄμμα τοῦ νοῦ ἐκκαθάρωμεν. Διά τοι τοῦτο ὁ Κύριος ἡμῶν Ἰησοῦς Χριστὸς ἔφη· "Ἡ βασιλεία τῶν οὐρανῶν ἐντὸς ἡμῶν ἐστι"· δηλῶν μένουσαν ἔνδον καρδίας τὴν θεότητα.[33]
>
> At every hour and moment let us guard our heart with all diligence from thoughts that darken the soul's mirror; for on that mirror Jesus Christ, the wisdom and power of God the Father, forms Himself and luminously inscribes Himself. And let us seek unceasingly within our heart the kingdom of heaven, as the mustard seed, as the pearl, as the leaven. Indeed, if we cleanse the eye of the *nous* we will find all things hidden within us. This is why our Lord Jesus Christ said, "The kingdom of heaven is within us", indicating that the Divinity dwells in our heart.[34]

Mirrors in the classical world were made of bronze. The metal had to be carefully polished to create a reflective surface. And it had to be kept polished, so that the reflective surface would not be dulled by oxidation.

We will not fully appreciate this reference to mirrors unless we know how mirrors were understood in the Greek world.[35] Plato, in the *Timaeus*, explains that mirror images are formed when the light from the eye meets the light from what is seen on the surface of the mirror, and these two sets of rays of light mingle there to form the image. Thus, in the classical understanding, mirror images actually exist, formed on the surface of the mirror.

When the Fathers speak of the soul reflecting the image of God like a mirror, they were using the analogy to explain how the soul is a real, though dependent, image of God. It was made to reflect His image. The image is true, though God and His image remain distinct according to nature. As the soul is purified, it more accurately reflects God's image. It becomes more truly that image.[36]

St. Philotheus takes this one step further when he writes that Jesus Christ forms Himself, He imprints Himself (τυποῦσθαι) upon the polished mirror of the soul. He luminously inscribes Himself. To express this, the saint had to create a new word, φωτεινογραφεῖσθαι, 'He writes himself with radiance' upon the polished mirror of the soul. This word is found in the printed edition. A 14th-century manuscript at Sinai that includes this work gives the title 'Chapter of Abba Philotheus, Abbot of the Monastery of the All-Holy Theotokos of the Burning Bush in Sinai: On Prayer and Watchfulness', but does not contain the word, nor does it appear to

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[32] Hesychius the Priest, On Watchfulness and Holiness, 4, tr. Ware, 163.
[33] Philotheos of Sinai, *Νηπτικὰ Κεφάλαια Τεσσαράκοντα, Φιλοκαλία τῶν Ἱερῶν Νηπτικῶν*, 282.
[34] Philotheos of Sinai, *Forty Texts on Watchfulness*, 23, tr. Ware, 25, with alterations to the translation by the author.
[35] Papaioannou, Byzantine Mirrors.
[36] Louth, *The Origins of the Christian Mystical Tradition.*

be part of medieval Greek vocabulary, if a word search in the online database *Thesaurus Linguae Graecae* can be taken as a guide.[37]

Material evidence has shown us that after the 7th century, caravans laden with supplies and guides accompanying pilgrims continued to reach the monastery. Manuscripts and icons were created at Sinai, or brought there from Palestine and Syria. But the texts recovered by the Sinai Palimpsests Project have added immeasurably to our knowledge about the monastery during the 8th, 9th, and 10th centuries. They confirm that the monastery was an intrinsic part of the flourishing of Greek letters in Palestine in the 7th and 8th century. This continued to be the case at Sinai even after this period, as Greek remained the language of converse, study, and prayer. Sinai was also a centre where many other languages were spoken, and where important translations were made, transmitting to other peoples the spiritual heritage that had been preserved there. The miracle of Sinai is that the community was able to continue very much as it had of old. The link to the earliest Desert Fathers remained unbroken. And we now have manuscript evidence that Sinai, even then, drew to itself pilgrims from the farthest reaches of Christendom.

We turn with renewed appreciation to the spiritual writings of that time. They can now be set into a larger context. They no longer reach us as from a void.

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Michael B. Phelps

The Sinai Palimpsests Project (2011–2016): Goals, Methods, and Contributions*

ST. CATHERINE'S MONASTERY OF THE SINAI, ITS LIBRARY, AND ITS PALIMPSESTS

The Orthodox 'Sacred Monastery of the God-Trodden Mount Sinai', commonly known as St. Catherine's Monastery of the Sinai, maintains one of the world's oldest continually-operating libraries.[1] The Monastery was founded in the 6th century in a location where monks had been present for at least two centuries, and has operated since the 7th century within the context of Muslim rule. Protected by its remote location on Egypt's Sinai Peninsula and its centuries-old bond with its Muslim neighbors, the Monastery preserves more than 4,500 manuscripts dating from the 4th to the 19th centuries. The manuscripts are surprisingly diverse. They contain texts in 14 languages, and cover a range of genres, including Biblical texts, liturgy, hagiography, patristics, spirituality, and history, as well as a small but important number of classical poetic, scientific, and philosophical texts.[2] Together the manuscripts of St. Catherine's Monastery provide unparalleled evidence for the literature and history of Christians in the Eastern Mediterranean and shed light on the relations between Christian and Muslim communities.

Among the treasures of the Monastery library are 172 known palimpsests. Palimpsests are manuscripts made from recycled parchment. A scribe would remove bifolios from a codex, scrape and/or wash them to erase the writing, and then reuse the parchment to make a new manuscript. Among Sinai's 172 known palimpsests, only three had been extensively studied and published before the Sinai Palimpsests Project began in 2011, and among the many unpublished palimpsests, only a handful of their undertexts had ever been identified.[3] The palimpsests of St. Catherine's Monastery preserve thousands of pages of previously unstudied texts from Antiquity and the Middle Ages.[4]

The Sinai Palimpsests Project constitutes a strong argument that future discoveries in manuscript studies lie less in the chance discovery of a buried cache of texts and more in the application of new technologies to manuscripts in collections we know. The project offers a model for future, large-scale programs to recover unreadable texts not only from palimpsests, but also from manuscripts either damaged by fire or water or rendered illegible due to the effects of time.

AN OPPORTUNE MOMENT

In spring 2007, Father Justin Sinaites, Librarian of St. Catherine's Monastery, visited The Walters Art Museum in Baltimore to observe the spectral imaging of the *Archimedes Palimpsest* and meet the scientists working to recover the erased texts of that famous palimpsest.[5] Father Justin was prescient to visit. The innovations

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* This article is dedicated to the memory of Nikolas Zarkantzas, Associate Director of the Sinai Palimpsests Project, who passed away tragically on 15 August, 2016, at the age of 53. Without his leadership, the project would not have happened.

1 For the history of the library, see now Giulia Rossetto, *Three Euchologia*, 17–50.

2 Most of Sinai's manuscripts are in Greek, but substantial numbers of manuscripts are in Arabic, Syriac, Georgian, and Slavonic. Smaller numbers of manuscripts are in Christian Palestinian Aramaic, Latin, Ethiopic, and other languages, even Hebrew.

3 Three Sinai palimpsests published prior to the project: Sin. syr. 30 or *Sinaiticus Syrus*, a palimpsest preserving the oldest and most extensive copy of the Old Syriac Gospels (Lewis, *Old Syriac Gospels*); and Sin. geo. NF 13 and Sin. geo. NF 55, palimpsests preserving the only surviving works in Caucasian Albanian (Gippert *et al., Caucasian Albanian Palimpsests*).

4 Conservatively calculated between 10,000 and 14,000 palimpsest pages, though the total is not yet known.

5 David Cooper, former Librarian at Corpus Christi College, Oxford University, accompanied Father Justin and contributed to the early discussions of a text recovery project at St. Catherine's Monastery.

achieved during the Archimedes Palimpsest Project provided the means to mount an ambitious project to recover thousands of pages of erased texts from the Monastery's many palimpsests.

PROJECT GOALS AND PARTNERS

After a pilot project in 2009 that demonstrated the feasibility of using advanced spectral imaging in the Sinai, St. Catherine's Monastery and EMEL reached agreement to undertake a five-year project (2011–2016) to recover erased texts from palimpsests in the Monastery's library.[6] The project was funded by a generous grant of $2.1 million from the Arcadia Fund, London. With the agreement of the Monastery, the UCLA Library joined the project in 2013 to archive project data and host it online for access by researchers.

The goals of the project were straightforward:
1. Render the erased texts of Sinai palimpsests legible using spectral imaging
2. Identify and paleographically describe the erased texts, as possible
3. Publish resulting images online, made accessible by a searchable catalogue

Work on the project was also informed by two secondary or instrumental goals:
1. Improve the efficiency of spectral imaging for application at the 'collection level'
2. Expand the toolset for imaging palimpsests by responding to new challenges

The first of these secondary goals was especially important. Before the Sinai Palimpsests Project, spectral imaging had been applied mostly to 'celebrity palimpsests', that is, palimpsests where the erased texts were at least partly identified and recognized as important, but not sufficiently legible for transcription or reconstruction. Spectral imaging can be expensive and labour intensive, not only in the capture of images but even more so in the processing of the captured data to create derivative images, 'processed images', that maximize the legibility of the erased texts. Only celebrity palimpsests could attract the investment necessary for spectral imaging. However, libraries in Europe, the Caucasus, the Middle East, and elsewhere hold thousands of palimpsest folios with undertexts that are unidentified or insufficiently studied. Many important texts from Antiquity and the Middle Ages may still lie unrecognized.

In light of the above, efforts to reduce costs and improve efficiency are needed, so that spectral imaging can be applied broadly and cost effectively to entire collections of palimpsests, as well as manuscripts rendered illegible by other causes, such as water or fire damage. Here St. Catherine's Monastery played a unique role. The universal recognition of the importance of the Monastery's library attracted the interest and the funding to support an ambitious multi-year project to recover hundreds of undertexts from its palimpsests. Since so little was known about the contents of Sinai's palimpsests, no attempt was made during the project to select palimpsests with especially interesting undertexts. Palimpsests were selected for imaging based on their physical stability and on their (suspected) undertext language, since we wanted the project to represent each of the languages in Sinai's library proportionally.

By imaging a large volume of diverse palimpsests, the project delivered to scholars not only new copies of texts from Late Antiquity and the Middle Ages—including previously-unattested works—but also broad data to explore questions about the creation and circulation of palimpsests, the selection of manuscripts for palimpsestation, and the occasions or factors that motivated palimpsestation.

[6] The Early Manuscripts Electronic Library and the Library of the University of California Los Angeles thank His Eminence Damianos Archbishop of Sinai, Faran and Raitho, the Holy Council of St. Catherine's Monastery of the Sinai, and Father Justin Sinaites, Monastery Librarian, for their collaboration and enthusiasm which made the Sinai Palimpsests Project possible. EMEL and the UCLA Library also thank the Arcadia Fund (London) for its generous and faithful support over the five years of the project.

METHODS AND PROCEDURES[7]

The application of spectral imaging to a large and diverse body of palimpsests required a disciplined and efficient workflow and tools for processing large quantities of spectral data.[8] A text recovery project of this magnitude would have been impossible without the capability to batch process large quantities of spectral data and achieve legible images (see 3a below).

The work of the Sinai Palimpsests Project proceeded in five steps. The progress of images and metadata for each palimpsest folio through these five steps was tracked by a single project database.[9]

1. *Evaluation and data entry.* Before a manuscript was imaged, Father Justin, Monastery Librarian, evaluated it to determine if it could be safely handled. Claudia Rapp, Project Scholarly Director, then created a detailed codicological analysis and established the conjoints of each recto and verso. Knowing which texts appear on the same bifolio was critical to reconstructing the undertexts of a palimpsest codex. During the codicological analysis, a database record was created for each component of a manuscript to be spectrally imaged. This enhanced the efficiency and accuracy of the imaging.

2. *Image capture.* EMEL's imaging team consisted of two camera operators from Greece,[10] and the quality of the captured data testifies to their outstanding work through 60 weeks onsite. Logistics on the ground were provided by the Jebelya Bedouin and the staff of the Monastery's hostel. The spectral imaging system was based on the innovations of the Archimedes Palimpsest Project, with improvements and additions made over the course of the project in Sinai.[11] The imaging system was mounted on a computer-controlled cradle designed to support fragile codices during imaging.[12]

Each recto and each verso was imaged 28 to 33 times (by comparison, the Archimedes Palimpsest Project produced 16 images per folio), using five modalities of image capture:

a. *'Standard' spectral imaging.* Each page was illuminated with 12 narrow bands or wavelengths of light from the ultraviolet (365 nm) to the infrared (940 nm).

b. *Raking illumination*, i.e., light projected onto the parchment at a low angle of incidence to discern surface texture, such as traces of lines or of erasures.

c. *Spectral fluorescence imaging.* When parchment is illuminated with short-wavelength light (ultraviolet or blue), it absorbs some of the short-wavelength light and emits light at a longer wavelength. For example, when parchment is illuminated with ultraviolet light, it fluoresces or 'glows' yellow. Since the fluorescent light comes from within the parchment, even the faint traces of erased ink on the surface of the parchment suppress the fluorescent emission and become more visible. We used a colour filter wheel that rotates in front of the camera to analyze the colour components of the fluorescence. Images of the separate colour components of the fluorescent emission of the parchment revealed different features of the undertext.

d. *UV reflectance imaging.* The filter wheel included an ultraviolet pass filter that blocks all the visible light of fluorescence and transmits to the camera only ultraviolet light reflected off the surface of the parchment. This often provides the best images of the erased text where the parchment has suffered abrasion or been severely damaged.

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[7] The following section was adapted from Rapp and Phelps, The Sinai Palimpsests Project.

[8] The overall project workflow and data management procedures were designed primarily by Michael Toth of R.B. Toth Associates and Doug Emery now of the University of Pennsylvania.

[9] Designed by Doug Emery in consultation with Claudia Rapp (University of Vienna) and other project leaders and administered by Susan Marshall (EMEL Data Operations Manager).

[10] Lead Camera Operator Damianos Kasotakis, now EMEL's Director of Imaging, and Second Camera Operator Evangelos Theodorou.

[11] The spectral imaging system featured spectral light sources (reflective, raking and transmissive) by William Christens-Barry of Equipoise Imaging LLC and a 40mp monochrome camera and PhotoShoot software that integrated camera and lights by MegaVision.

[12] The Preservation Book Cradle by Stokes Imaging (Austin, Texas), based on a design by Alan Buchanan (Alan Buchanan Designs).

e. *Spectral transmissive illumination* was newly developed for the project.[13] Where iron gall ink severely eroded the flesh side of parchment, often the remaining residues of the erased ink are insufficient to be elucidated by spectral imaging with a reflective light source. But since the parchment is thinner where iron gall ink eroded it (known in German as 'Tintenfraß'), backlighting the folio with infrared light often produced a remarkably legible image of the erased text.

At the conclusion of each spectral imaging session, the collected images and metadata were forwarded to EMEL's Data Operations Manager, who verified the integrity of the data and harvested metadata for the project database.

3. *Image Processing* involves analyzing the captured images of a folio and combining data from multiple captured images in order to generate derivative images that maximize the legibility of the erased texts. For image processing, spectral data was shipped to four participating scientists (Keith Knox, Roger Easton, Jr., William Christens-Barry, and David Kelbe).

a. *Batch processing.* Project scientist Keith Knox developed image processing algorithms that exploited well-known reflective properties of iron gall ink and that could be applied in a semi-automated manner to all spectral data captured by the project. Since the majority of undertexts in Sinai's palimpsests are iron gall ink (or behave like it), this batch processing generated legible images for 65% to 70% of the imaged pages.
Iron gall ink appears with the greatest contrast in short wavelength light (ultraviolet and blue) and becomes less visible in longer wavelengths (red and infrared), ultimately disappearing at approximately 1200 nm. In palimpsests, as the image sequences progress from shorter to longer wavelength light, both the overtext and the undertext tend to disappear, but the undertext disappears first because it is fainter. Batch processing algorithms combined data from an ultraviolet or blue image where both undertext and overtext appear with a red or infrared image where only the overtext appears, in order to isolate the undertext and distinguish it from the overtext. For each palimpsest page, the software produced 25 or more processed images, based on different combinations of long and short wavelength images. Many combinations of captured images were necessary to produce legible results for the many different undertexts encountered by the project.

b. *Supervised Processing.* If batch processing did not yield legible results, the folio was referred to participating scientists Roger Easton, Jr., William Christens-Barry, and David Kelbe. In manual, labour-intensive processing, these scientists used a variety of methods to try to elucidate the undertext of difficult folios, often in close collaboration with the scholars, another hallmark of the project. In most cases, they used statistical processes—principle component analysis (PCA) or independent component analysis (ICA)—which isolated different features in the 'stack' of 28 to 33 captured images of each page, such as the parchment, the overtext, and the undertext. Due to the volume of data, it was impossible to apply supervised processing to all pages that warranted it. This is one area where work remains to be done.

Processed images were forwarded to EMEL's Data Operations Manager, who then distributed them to 27 participating scholars, based on their language and scripts of expertise.

4. *Cataloguing*. Under the direction of Claudia Rapp, Project Scholarly Director (University of Vienna), an international team of 27 experts in the various languages and scripts represented in the palimpsests created catalogue descriptions for the undertexts, analyzing the scripts and identifying the texts.[14] For this purpose, the

[13] William Christens-Barry of Equipoise Imaging LLC developed a first-of-its-kind spectral transmissive light source that was wedge-shaped so that it could be inserted behind the folios of a codex. MegaVision has now developed a transmissive spectral light source used by EMEL.

[14] Those who contributed their scholarly expertise are (in alphabetical order): Zaza Aleksidze, André Binggeli, Sebastian Brock, Michelle P. Brown, Guglielmo Cavallo, Steve Delamarter, Alain J. Desreumaux, Ernst Gamillscheg, David Ganz, Paul Géhin, Jost Gippert, Sidney Griffith, Getatchew Haile, Dieter Harlfinger, Hikmat Kashouh, Vasilios Katsaros, Grigory Kessel, Daniela Mairhofer, Heinz Miklas, Christa Müller-Kessler, Panayotis Nikopoulos, Pasquale Orsini, Bernard Outtier, Giulia Rossetto, Alexander Treiger, Agamemnon Tselikas, and Nigel Wilson.

project designed a sophisticated electronic database of palimpsests, building on previous work by Doug Emery for the Archimedes Palimpsest Project and the Walters Art Museum.[15]

5. *Online Publication*. On behalf of St. Catherine's Monastery of the Sinai, the UCLA Library is hosting an online digital library of the Monastery's palimpsests imaged by the project (www.sinaipalimpsests.org).[16] The digital library includes processed images and descriptive metadata (not editions) for each manuscript and for each recto and verso. All project data has been deposited for long-term preservation with the UCLA Library and at the Holy Monastery in Sinai.

PROJECT OUTPUT

From 2011 through 2015, the project conducted 20 spectral imaging sessions at St. Catherine's Monastery for a total of 60 weeks onsite. More than 40 persons contributed to the collection, management, processing, interpretation, and publication of project data, including camera operators, data managers, imaging scientists, technicians, scholars, and librarians.

These collective efforts generated:

- Spectral data for 6,800 palimpsest pages, representing 74 palimpsest codices
- More than 200,000 raw images (approximately 30 raw images/page)
- Approximately 212,000 processed images. Batch processing generated approximately 28 processed images per page, based on different combinations of raw images
- 50TB of data, including approximately 25TB of raw data and 25TB of processed images
- Identification of 307 discrete erased texts in 11 languages

SOME CHARACTERISTICS OF THE RECOVERED ERASED TEXTS

The diversity of the recovered undertexts in language, date, and content is remarkable. The distribution of languages among the recovered undertexts is as follows:

Greek undertexts	3,058 manuscript sides
Syriac	1,617
Georgian	710
Christian Palestinian Aramaic	479
Arabic	436
Caucasian Albanian	276
Slavonic	115
Armenian	118
Latin	83
Ethiopic (Ge'ez)	34
Coptic	2

The recovered undertexts constitute a substantial corpus of mostly unstudied texts from the first millennium. Based on dates assigned by participating scholars, the dates of copying of the recovered texts range from the 5th to the 13th centuries, and more than 100 of the recovered undertexts were copied in the 6th century or earlier.[17]

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[15] Emery and Rapp, KatIkon.

[16] UCLA Library personnel who contributed substantially to the online publication of project data include Stephen Davison (now of the California Institute of Technology), Todd Grappone, Elizabeth McAulay, Kristian Allen, Kevin Clarke, and Mark Matney.

[17] While most dates are based on paleographical analysis, at least two undertexts include colophons with dates. Undertexts written in early or archaic Christian Palestinian Aramaic script are not included in this count of undertexts from the 6th century or earlier, since the potential date range for this script is very broad.

The diversity of content and genres among the recovered undertexts reflects the contents and genres of the Monastery's library, even though there are significant differences.

- A surprisingly large percentage—43%—of the identified undertexts are Biblical, including lectionaries (29% New Testament and 14% Old Testament).
- 11 of the undertexts are classical works in Greek or in Syriac translation. 8 of these 11 classical texts are medical, and 6 of the 11 were previously unknown.[18]

The rest of the undertexts include liturgical, hagiographical, patristic, ascetic, and spiritual texts in various languages.

As would be expected, the extent of preservation of the undertexts varies widely. Some undertexts are substantially preserved, and fortunately these include copies of previously unknown works. Examples include:

- 92 pages of a previously unknown Christian poem that mentions Old Testament characters (Greek, 6th to 7th century, found in Sin. geo. 49 + Sin. geo. NF frg. 73a)
- 96 pages of a previously unknown commentary on the Old Testament (Syriac, 6th to 7th century, found in Sin. ar. 514)
- 74 pages of a previously unknown Judeo-Arabic translation of Genesis and Exodus (10th–11th century, found in Sin. gr. 930 [*Diktyon* 59305])

Of course, most of the undertexts preserve only a portion of a much larger work, and the smallest undertexts may preserve only a few lines from a not-yet-identified work. Even where only a few lines are preserved, an undertext may contribute substantially to our knowledge of the transmission and circulation of a work or to the history of languages and scripts used in the Monastery and its environment through the centuries.[19]

The identifications of text and script for each recto and each verso are published in the online database, along with relevant bibliographic information. In addition, the participating scholars have begun to publish the results of their work on the palimpsests that they have worked to identify, including in some cases the creation of new text editions.

CONTRIBUTIONS TO SCHOLARSHIP

The Sinai Palimpsests Project provided scholars with images and descriptions of 307 erased texts from Late Antiquity and the Middle Ages preserved among the palimpsests of St. Catherine's Monastery. A large percentage of these undertexts fit one or more of the following categories: the oldest witness to a known ancient text; the first instance of a known ancient text in a particular language (e.g., translations of Greek works into Christian Palestinian Aramaic); and the discovery of a heretofore unknown text from Christian, Jewish, or Classical antiquity.

Even where scholars judge the contents of some undertexts to be less intrinsically interesting, the relationships between undertexts and overtexts in a palimpsest codex provide opportunity to study patterns of textual transmission and the relationships between communities who created the under- and overtexts.

The undertexts of Sinai's palimpsests also provide new samples of scripts in which various languages were written during the first millennium. In some cases, the relationship between overtext and undertext may provide new, more reliable criteria for the dating of a script style. For example, an overtext in a script with a relatively secure date may provide a *terminus ante quem* for a script in the undertext with an insecure date.

Finally, the project provides new information about the history of St. Catherine's Monastery and the central cultural role it has played through the ages.

CONTRIBUTIONS TO THE SPECTRAL IMAGING OF MANUSCRIPTS

The innovations of the Archimedes Palimpsest Project were a rare boon for manuscript scholars. Normally, those in the humanities must find creative ways to use imaging technologies originally developed for remote

[18] Among the spectacular new findings are pieces of a previously unknown poem in hexameters that mentions the childhood of the god Dionysus. See Rossetto, Fragments from the Orphic Rhapsodies? and Rossetto *et al.*, A Revised Text.

[19] Rapp, Secluded Place or Global Magnet? See also the contribution of Claudia Rapp in this volume.

sensing or medical research. But after the *Archimedes Palimpsest* was purchased at auction, its owner provided approximately ten years of funding to a team of scientists to develop the means to recover its erased texts. The resulting innovations provide manuscript scholars with spectral imaging solutions developed specifically within and for their field. This injected new energy into the field of manuscript imaging.

The Sinai Palimpsests Project followed on the heels of the Archimedes Palimpsest Project and fulfilled an important role. The project provided a funded five-year program wherein the scientists of the Archimedes Palimpsest Project could continue to improve and supplement their spectral imaging solutions. For example, in its final stages the Archimedes Palimpsest Project demonstrated the utility of spectral fluorescence imaging to recover erased texts, and then the Sinai Palimpsests Project provided the context where this imaging method was implemented programmatically with purpose-built equipment. In Sinai, spectral fluorescence imaging provided the data most important for recovering the greatest number of undertexts. The Sinai Palimpsests Project also added spectral transmissive illumination to the essential toolkit for palimpsest imaging. The project experimented with transmissive illumination during its 2009 pilot phase and introduced a spectral transmissive light source in 2011.

THE FUTURE OF THE SINAI PALIMPSESTS PROJECT

We hope that the impact of the project on scholarship and on the spectral imaging of cultural heritage is only beginning. The following are agendas for future research.

1. *Application of 'big data' questions to project metadata.* Metadata about such a large quantity of diverse palimpsests offers researchers opportunity to pose questions that take into account the totality of project data. Questions may address how manuscripts were selected for palimpsestation, the conditions that contributed to palimpsestation, the circulation of palimpsests or of erased parchment, and the relationships between undertexts and overtexts and between the communities that produced them. For a first foray, see the contributions of Rapp and Vollandt in this volume. It may eventually be possible to suggest criteria to distinguish between palimpsests created in Sinai and palimpsests brought to the Monastery.

2. *Materials analysis.* The raw spectral data may be used to typify the inks of both the overtexts and the undertexts of the palimpsests. Such research may reveal a great deal about the history and provenance of the palimpsests. Although the data from spectral imaging is insufficient to identify ink types with precision, the spectral data may be used to sort inks into broad classes and to identify outlying inks which respond to spectral illumination differently than others. More precise tools (e.g., X-ray fluorescence and Raman spectroscopy) may then be applied to sample inks from each class and to outlying inks.

3. *New image processing of the most difficult-to-read undertexts.* Many important undertexts among Sinai's palimpsests remain very difficult to read, even after the application of image processing methods available during the project (2011 to 2016). Since the conclusion of the project, new image processing methods have become available that can be applied to the original project data and improve the legibility of important undertexts. Additional image processing may make possible the identification of undertexts now listed as 'unidentified', or enable the transcription and reconstruction of important undertexts which have been identified, but until now have not been rendered sufficiently legible for transcription.

4. *Resumption of spectral imaging of palimpsests at St. Catherine's Monastery.* Over five years, the Sinai Palimpsests Project imaged 74 palimpsests (6,800 pages) out of a total of 172 known palimpsests preserved in the Monastery library. Almost 100 palimpsests have not yet been spectrally imaged, constituting potentially 8,000 pages of still unstudied Late Antique and Medieval texts. Since the selection of palimpsests for imaging during the project was based on their state of conservation and the undertext languages they included and not on their importance to scholars (which was unknown), many important undertexts may lie yet unrecognized.

THE SINAI LIBRARY DIGITIZATION PROJECT

In 2018, St. Catherine's Monastery, EMEL, and the UCLA Library embarked upon a new collaboration to digitize the Monastery's extensive manuscript library, beginning with its Arabic and Syriac manuscripts. Why are the parties undertaking an ambitious digitization project, rather than completing the spectral imaging of the Monastery's palimpsests? The answer is two-fold. First, since scholars often cannot visit the Monastery due to the perceived volatility of the region, both the parties and funders emphasized the wisdom of a large-scale digitization program to make the contents of the Monastery's extensive manuscript library accessible to researchers unable to visit Sinai. Second, just as archaeologists do not excavate the entirety of an ancient city at once, it is prudent after five years of imaging to step back and allow imaging technologies to advance and offer new capabilities before returning to the task of imaging more of Sinai's palimpsests.

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Claudia Rapp

A Cache of Palimpsests and Christian Manuscript Culture across the Medieval Mediterranean: First Results of the Sinai Palimpsests Project

The Holy Monastery of St. Catherine is home to one of the largest collections of parchment manuscripts from the Middle Ages, preserving a precious record of Christianity especially in the first millennium. In the Old Collection and in the New Finds that were (re-)discovered in 1975, it contains a total of more than 4,500 manuscripts in 14 languages. This wide spread, which will concern us again below, reflects the history of the Monastery.[1] Founded under the Emperor Justinian between 548 and 565, it has until the present day been home to Greek-speaking, or at least Greek-praying, monks in doctrinal unity with the Patriarchate of Constantinople, while traditionally the election of the *hegoumenos* (abbot) is confirmed by the Patriarchate of Jerusalem. Throughout its long history, the Monastery has attracted visitors, pilgrims and monks from all the corners of the world.[2]

This is reflected in the rich and linguistically varied manuscript holdings in the Monastery's library, as people brought manuscripts with them which they left as pious gifts or bequests—or, in some instances, copied new manuscripts on site. The number of manuscripts associated with the Sinai is even larger once we take into account also those manuscripts that once belonged to the Monastery and are now dispersed in collections across the globe, from St. Petersburg to Los Angeles. The oldest manuscript with a Sinai connection is a case in point: the *Codex Sinaiticus*, which once contained the full text of the Septuagint and the New Testament, was most likely copied in the 380s in Alexandria. The exact date when it reached the Monastery is unknown, but since the late 19th century, the bulk of it has made its way through appropriation, donation, and sale, to the British Library in London, while only one bifolio that was discovered among the New Finds remains in the Monastery.[3] St. Catherine thus joins a small handful of monasteries—other examples in the Latin West are St. Peter in Salzburg or St. Gallen in Switzerland—that can look back on an unbroken tradition of augmenting and preserving its manuscript collection through the centuries.[4]

St. Catherine's is further distinguished by its possession of the largest number of palimpsested objects to be preserved in one place. We are currently aware of 172 items, both from the Old Collection and especially from the New Finds—the discarded fragments, folios, bifolios, and quires that came to light in an abandoned room in 1975. This means that ca. 3.7% of items in the entire collection are known to contain palimpsested material—and that percentage is increasing as research on the collection and especially on the New Finds progresses and new palimpsests are identified. By comparison, the Biblioteca Laurenziana in Florence has 29 palimpsests, the Austrian National Library in Vienna 23.[5]

The Sinai Palimpests Project (SPP), as described by Michael Phelps in this volume, has so far made 74 palimpsested objects accessible online, 54 of them from the New Finds.[6] With some justification, this may be called a 'cache', i.e. a deliberate assemblage of valuable objects that were kept in a safe place. The parchment material in the New Finds survived in a storage room precisely because of its poor condition. It consists of

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[1] This article has benefited from the scholarly input and research assistance of Giulia Rossetto and Cosimo Paravano, as well as Michael Phelps. I am also grateful to Kathryn Morgan for her comments on an earlier version. The research for this article was undertaken in the context of the FWF Wittgenstein-Award Project 'Mobility, Microstructures and Personal Agency' (Z288-G25).

[2] The long tradition of monastic life at the foot of Jebel Mousa and of the monks' activities as authors and scribes, and as readers and owners of books, is discussed by Father Justin Sinaites in his contribution to this volume.

[3] BL Add. 43,725 (*Diktyon* 39225). See the British Library website: https://www.bl.uk/collection-items/codex-sinaiticus (accessed 01.07.2023).

[4] See Nievergelt and Dora (eds.), *Fenster zur Ewigkeit*.

[5] Grusková, *Untersuchungen*; Martin and Grusková, Scythica Vindobonensia.

[6] The website http://sinaipalimpsests.org (accessed 01.07.2023) gives access to the Research Site where, after registration, the processed images and short catalogue descriptions for the erased undertexts are accessible.

fragments, individual folios, bifolios and quires. These have been catalogued individually, resulting in a high numerical count of palimpsested items. Further research into the *membra disiecta* may well prove (and has in some instances already done so) that some of these individually catalogued items were part of the same original codex whose components are now scattered across the New Finds, the Old Collection, or even manuscript libraries and other collections further afield.

Already at this stage, the material assembled in the Sinai Palimpsests Project represents the largest sample of palimpsested material from the same location ever to have been studied as a group. In the following, I will present some preliminary results that may well be subject to refinement and revision as the study of the Sinai palimpsests continues. The focus will be on the corpus of palimpsests as a whole, rather than on individual manuscripts and text discoveries, as the latter in particular will be made public by the scholars who participated in the project.

The manuscripts studied so far in the Sinai Palimpsests Project can help shed light on three sets of questions that will be the focus here: palimpsests and their production and use; the interaction of language groups in the Christian Middle Ages; and the interaction of religious groups across the medieval Levant.

By way of introduction, it is important to recall a few insights from the study of Byzantine manuscript culture in general:

1. The date of authorship of a text is rarely identical with the date of copying of a surviving manuscript. Indeed, most of the manuscripts that survive from the Byzantine period contain texts that were composed many centuries earlier, often in Classical Antiquity. The gap between date of authorship and date of copying narrows in the 12th/14th centuries with the increase in literary production combined with higher survival rates of manuscripts, but even in this instance a gap of several decades remains. Autographs, i.e. manuscripts whose text was written out by the author himself, are exceedingly rare.

2. The place of copying of a manuscript is rarely the place where it is later preserved. This is true even at St. Catherine's, a monastic library in a remote location, as shall be seen below.

3. We know next to nothing about the origin of the writing support—in this instance, the parchment—used by copyists. While there are ample references by Byzantine *litterati* to the difficulty of obtaining parchment, it is not at all clear where parchment was produced or over what distances it was traded. Even less is known about the production, trade, and use of palimpsested material.[7]

PALIMPSESTS, THEIR PRODUCTION AND USE

What Kind of Parchment Sheets Were Palimpsested?

1. Palimpsests include discards that were generated in the process of manuscript production, for example original folios where the ruling was imperfect when the lines were not at right angles, or spaced too close or too far from one another.[8]

2. Palimpsests include discards that were created when a manuscript was left incomplete, for example when the text was produced but a large inner space was left out for the work of an illuminator.

3. Manuscripts were reused in two different ways: either the original bifolios were left intact after disassembling the quire, with the overtext running parallel to the undertext, resulting in a large-size codex; or bifolios were cut in half, turned on their side and folded in order to create a new bifolio at half size, with the overtext running at 90 or 270 degrees to the undertext. Accordingly, many of the manuscripts in Sinai Palimpsests Project can be classified as small or medium size.

This practice means that palimpsested parchment was often used for the creation of manuscripts of utilitarian character for which a handy size was important or at least no hindrance. Indeed, of the 74 Sinai palimpsests studied so far, 41 have liturgical texts in the *scriptio superior*.

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[7] The most recent comprehensive treatment of palimpsests and their study is Lucà (ed.), *Libri palinsesti greci*. See also Kotzabassi, Codicology and Palaeography. For a similar approach to the present article, with a wider geographical scope, see Kohlbacher, Palimpseste als Geschichtsquelle. Rossetto, "Library" and "Scriptorium", shows that the Georgian scribe Iovane Zosime, who was active in the late 10th century, used palimpsested sheets from the same source (Cyril of Jerusalem, *Catecheses*, in CPA) for the creation of three manuscripts over a period of 11 years, first at Mar Saba and later in the Sinai.

[8] For example, Sin. gr. 212 (*Diktyon* 58587), f. 98rv.

4. In rare cases, we encounter what might be dubbed 'extreme palimpsestation': bifolios sewn together from a patchwork of small pieces of palimpsested parchment. Sin. ar. NF 8 (also discussed elsewhere in this volume for its important undertexts) is a case in point: up to five pieces of different origin were stitched together to make up one folio.[9]

5. These are well-established observations that have been made in other contexts of palimpsest studies. In addition, Sinai Palimpsests Project has brought to the fore a lesser-known feature: palimpsests were also created from original objects whose format had become obsolete. Among the Greek undertexts, there is a significant number of scrolls that were cut up for later reuse, as Pasquale Orsini's work for Sinai Palimpsests Project has shown.[10] It is worth noting that the erased texts on the original scrolls are often of a rather late date and in Greek minuscule, thus suggesting that the reason for erasure was not that the script had become obsolete (as would have been the case with majuscule writing), but that it was the format (and perhaps the text) that was considered recyclable. Once all this material has been properly studied, it may shed new light on the persistence of the use of scrolls as a book form in Byzantium long after the adoption of the codex, which increased in popularity in the course of the 4th century.

How Were Palimpsested Sheets Used?

First, it must be noted that entire codices made up of palimpsest are relatively rare. Much more frequent is the case where individual quires in a codex are copied on palimpsested material. This was often done at the time when a new codex was created, but it could also happen that a quire of palimpsested folios was inserted later, with overtext written in a different ink and/or scribal hand than the remainder of the codex. Scholars who created library catalogues have often overlooked individual quires copied on palimpsest. On a few occasions in the course of Sinai Palimpsests Project, palimpsested quires in intact codices of the Old Collection were discovered by chance and happenstance.[11]

Second, we can be reasonably certain that the people who reused palimpsested parchment sheets were not aware of what had been written underneath. Today, the presence of erased ink is sometimes discernible to the naked eye, in more or less faint traces. This is most easily visible in the margins of a folio, where there is no overtext. Other indications for the presence of palimpsest are: a rough surface of the parchment, suggesting that original text has been scraped off; faint smudges of ink that indicate its removal by the application of liquid; prickings for the ruling scheme of the erased text that do not correspond to the text on the page; and horizontal creases along the top or bottom margin that constituted the centrefold of an original bifolio which was cut up for reuse at 90 or 270 degrees.[12] Whatever traces of undertext are discernible today to the naked eye have probably emerged from the pages over time, although the exact process by which this happens remains to be studied.

We have to imagine that at the time of reuse, palimpsested sheets of different provenance, often even in different languages, were simply piled up in random order. As a result, palimpsested folios from the same original manuscript were placed out of sequence in the creation of a new manuscript, or even dispersed across several different new codices that are now found in different libraries.[13] Scholars have begun the painstaking work of reconstructing the original sequence of the erased undertext. A special viewing tool on the Sinai Palimpsests Project website facilitates the import of images from other sources to allow the recreation of the original sequence of the *Mutterhandschrift* (i.e. the original manuscript) on the basis of the undertext.

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[9] Sin. ar. NF 8, f. 52rv, f. 116 rv.

[10] For example the erased texts in the following manuscripts: Sin. ar. NF 8 (Arabic sales deed, dated 841); Sin. gr. 2053 (*Diktyon* 60428, Greek *Anthology of Psalms*, 9th-century majuscule); Sin. geo. 49 (Greek Liturgy of St. James, 9th-century minuscule); Sin. gr. 446 (*Diktyon* 58821, Greek *Collection of Liturgical Hymns*, 9th-century minuscule).

[11] An example is Sin. gr. 962 (*Diktyon* 59337), which contains one quire (three bifolios) written on palimpsest. One of them is double palimpsest.

[12] Examples are: Sin. gr. NF MG 2 (*Diktyon* 61040), f. 27v (scraping), Sin. gr. 925 (*Diktyon* 59300), f. 80v (washing), Sin. gr. 212 (*Diktyon* 58587), f. 46r (prickings).

[13] A good example is Sin. gr. NF MG 14 (*Diktyon* 61052), where Greek and CPA undertext appear in random order. As the work of Christa Müller-Kessler has shown, the translation into Christian Palestinian Aramaic of the *Catecheses* of Cyril of Jerusalem, which were previously known only in Greek, is now dispersed in the undertext of five manuscripts, in St. Catherine's, in St. Petersburg, and in Norway: Sin. geo. NF 19, Sin. geo. NF 71, Petropol. syr. 16, Oslo Schøyen 35, Oslo Schøyen 37.

What is the Date of the Undertexts?

Of course, firm dates for copying are rare enough in regular manuscripts. For the erased layers, we only have two cases of dated material: in Sin. ar. 514, the erased Syriac text containing the Letter to the Hebrews is accompanied by a colophon with the date of 561/562 CE.[14] In Sin. ar. NF 8, among the many erased texts in multiple languages are 10 folios written in Arabic, perhaps originally from a scroll, that contain a deed for the sale of land in Ramla, with the date of 841 CE. In a few instances, the erased text reveals a colophon with the name of the copyist. One example is the Georgian scribe Gabriel who was active in the late 10th century and whose colophon is preserved in one of two erased layers of a folio that has no overtext (Sin. CPA NF frg. 16, f. 2v).[15]

To establish the date of copying of the undertexts and of the overtexts, we depend entirely on palaeographical criteria, such as script styles. Here, too, Sinai Palimpsests Project can yield important new insights. For the Greek texts, a large number of the erased scripts date from the 6th century. This was the century dominated by the long reign of the Emperor Justinian, who was also responsible for building the basilica and the walls around the Monastery in the Sinai. A second spike in erased scripts dates from the 9th century, the period of the *metacharakterismos*, when the Greek script changed from majuscule (capital letters) to minuscule (lower case letters). The Sinai Palimpsests Project is thus generating significant new amounts of documentation for the development of Greek majuscule writing. Indeed, in the undertext of Sin. gr. NF MG 99 (*Diktyon* 61137), Guglielmo Cavallo has identified erased New Testament writings in a Biblical majuscule of the mid-5th century, i.e. only two generations after the famous *Codex Sinaiticus* was copied. Until now, it had been thought that the earliest erased Greek was majuscule writing of the 6th century in Sin. syr. 30.[16] This pushes the earliest date of erased Greek in the Sinai collection back by one century.

What is the Time Span that Elapsed between the Application of the Undertext and the Application of the Overtext?

The time of erasure is impossible to know, although it is usually assumed that it was shortly before the folios were reused. This is an issue familiar from dendrochronology (where the freshly cut wood may be seasoned for up to ten years before use in a panel painting) and from the study of watermarks (where moulds with their distinctive designs were in use for about two years, and paper was used within three to five years of its production). In all these cases, including palimpsest production, the duration of stockpiling represents a significant and mostly unknown factor.

It is possible, however, to date the erased text and the overtext on the basis of palaeographical criteria, and thus to establish the time that elapsed between them. A detailed analysis that also takes into account any double and triple palimpsests (*bis rescripti*, *ter rescripti*) will have to wait until the entire Sinai collection of palimpsests has been imaged. For the time being, two extremes, demonstrating either very long or very short time spans between the date of the erased text and the date of the overtext, can be noted.

The first of these extremes is the Georgian *Menaion* in Sin. geo. 49, copied in the 13th century, on erased folios with original text in Arabic, Coptic, Georgian, Greek, and Syriac. Several of them are double or even triple palimpsest. The oldest erased scripts are 6th-century Greek majuscule with the Gospels of John and Mark (as the lowest layer of a double palimpsest) and 5th- to 6th-century Syriac Estrangela with the Gospel of Mark.[17] This means that the elapsed time between the application of scripts can be as long as seven or eight centuries. These are important insights for the history of book culture in general and of libraries in particular, where manuscripts must have been preserved over many centuries.

The opposite case, of a very short time span between the erased and the upper writing, is represented in Sin. gr. NF MG 2 (*Diktyon* 61040), where the Pauline Epistles in the upper text were copied in the 9th century, and two of the erased texts have been dated to the second half of the 9th century: the *Pandects* of Antiochus the Monk and the *Ecclesiastical History* of Socrates Scholasticus. In this case, only a few decades could have have elapsed between the two layers of writing.

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[14] This manuscript is discussed by Grigory Kessel in this volume.
[15] This manuscript is discussed by Bernard Outtier in this volume.
[16] Hunger, *Schreiben und Lesen*, 20.
[17] Sin. geo. 49, ff. 25rv, 26rv, 28rv, 29rv, 30rv, 42rv (Greek); f. 33rv (Syriac).

Of particular interest are double palimpsests (*bis rescripti*), which seem to be remarkably frequent in the Sinai collection: the Sinai Palimpsests Project has encountered folios with double palimpsest in 11 manuscripts out of 74. One example is Sin. ar. 514, which contains hagiographical texts copied in Arabic in the 9th century in the visible upper layer. Underneath are two layers of Syriac, one containing a treatise on medicinal plants, copied in the 8th or 9th century, while the lowest layer contains passages from the First Letter to Timothy, copied in the 6th century.[18] This means that New Testament text was erased after two or three centuries to make space for a work of medical use, but that this text in turn was very quickly removed and replaced with saints' *Lives*. A similar pattern occurs in the *Euchologion* manuscript Sin. gr. 962 (*Diktyon* 59337). This manuscript was copied in the late 11th century, but one quire of this manuscript was replaced at a later stage, probably because it was damaged, using palimpsested parchment. One bifolio of this quire (ff. 183rv+186rv) contains a double layer of palimpsest: the upper script, copied around the 13th century, is an *Euchologion*. Below that is an unknown *Kanon on St. Nicholas*, copied in the 12th century, and below that fragments from a kanon on the saints and martyrs Peter, Andrew, Dionysius, Paul, Christina, Heraclius, Paulinus, and Benedimus by Joseph the Hymnographer, copied after the mid-9th century. Here again, we observe the periodic reuse of parchment sheets, for the first time after three centuries, but the second time only after a very short period had elapsed.[19]

When scholars are reasonably certain about the date of the overtext, this has consequences for the relative date of the erased undertext which must come before it, thus providing a *terminus ante quem*. In the course of the Sinai Palimpsests Project, participating scholar Steve Delamarter has been confronted with the need to re-evaluate aspects of the history of the liturgy in Ethiopic on the basis of Sin. gr. NF M 90 (*Diktyon* 60917). The upper text is a Greek *Horologion*, copied in the 13th century. Several folios in this manuscript contain in the erased layer a funerary rite in Ethiopic that had previously been assumed to be of a later date.

What Can the Sinai Palimpsests Tell Us about the Textual Preferences of the Time? What Texts Are Erased and what Texts Substitute Them?

We have noted earlier that the people who used palimpsested sheets did not know what had been erased underneath. But they did know that they were using second-grade writing material. Hence, palimpsested folios are most common in manuscripts for frequent use, and in the medieval societies of Byzantium and the Christian Orient that meant liturgical texts, first and foremost, or theological, edifying, and hagiographical writing. We know that 22% of the extant *Euchologia* currently at St. Catherine's contain a certain amount of palimpsested folios. The figures are even higher for the *Euchologia* now in the Vatican (33%) and in Grottaferrata (39%).[20]

It should be noted that it is not only texts that were removed; sometimes erased pictorial material has also come to light in the course of Sinai Palimpsests Project. The erased undertext in Sin. ar. NF 8, ff. 16rv, 17rv, contains a text on medicinal plants, perhaps by Crateuas, copied in a 5th- to 6th-century majuscule, with drawings reminiscent of (but independent from) the *Vienna Dioscorides* of the 6th century (Österreichische Nationalbibliothek, Vind. med. gr. 1, *Diktyon* 71026).[21] In the double palimpsest Sin. slav. NF 5, whose overtext was applied in the second quarter of the 11th century, Heinz Miklas has detected in the lowest erased layer, written in Glagolica, a few faint traces of a figural drawing of a religious nature.[22] The erased texts also include very early musical annotation in a *Sticherarion* of the second half of the 11th century, under an *Euchologion* that was copied in the 13th or 14th century (Sin. gr. 960, *Diktyon* 59335).[23] The most spectacular find is the fragment of a line drawing that illustrates the *Novel of Apollonius of Tyre* in an erased layer of Sin. ar. NF 8, f. 18v, because it represents a rarity in several ways. It is a Latin work which tells a story set in pagan antiquity that continued to be an inspiration to virtue for Christians. Moreover, copied in an early majuscule prior to 650, the Sinai erased layer represents the earliest known non-Christian pictorial representation in a parchment manuscript.[24]

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[18] On this manuscript, see also the contributions by Grigory Kessel and by Giulia Rossetto in this volume.
[19] For a detailed discussion of this manuscript, see Rossetto, *Greek Palimpsests at Saint Catherine's Monastery*.
[20] Rossetto, *Three Euchologia*, 9.
[21] See the contributions of Damianos Kasotakis and of Giulia Rossetto in this volume.
[22] See the contribution of Heinz Miklas in this volume.
[23] For a detailed discussion of this manuscript, see Rossetto, *Greek Palimpsests at Saint Catherine's Monastery*.
[24] See the contributions of Michelle Brown and of Giulia Rossetto in this volume.

What Patterns Emerge with Regard to the Texts that Were Abandoned to Erasure?

Here again, we must assume that ease of access to parchment material combined with lack of interest in the texts they contained determined the selection of folios that were subjected to erasure. This could affect popular texts of a religious nature as these would have been available in multiple copies, or rare texts from pagan antiquity which were no longer deemed relevant, or indeed texts written in languages that were no longer in use or copied in scripts that were no longer fashionable.

Among the previously-unknown Christian works in Greek discovered in the erased layers are a *Kanon on St. Nicholas*, an *Anthology of Psalms*, and a version of the *Ladder of John Climacus*, a treasured work of monastic spirituality, then as now, and of special relevance in the Sinai where the author is believed to have lived, first as a member and later as the leader of the monastic community.[25]

The erased material from pagan antiquity, though not plenteous, holds a few important surprises that are discussed in detail by Giulia Rossetto in this volume: the Greek undertexts contain a previously-unknown text from classical mythology that was perhaps an Orphic rhapsody, as well as ancient medical texts, including new texts from the Hippocratic corpus. One of the Latin undertexts contains, as has been noted, the ancient *Novel of Apollonius of Tyre* accompanied by a line drawing.

LANGUAGE COMMUNITIES IN THE CHRISTIAN MIDDLE AGES THROUGH THE LENS OF THE SINAI PALIMPSESTS

In many instances, it is only thanks to modern technologies of multispectral imaging that it becomes possible to recover the lost written heritage of some language communities. In 1990, Zaza Alexidze discovered in the Monastery's Library (Sin. geo. NF 13, Sin. geo. NF 55) fragments of a Lectionary and parts of the Gospel of John written in Caucasian Albanian and copied probably as early as the 7th century. Until then, this language, which is related to the language spoken today by the Udi people in the Eastern Caucasus, had only been known from inscriptions on stone and from a manuscript glossary. Sinai Palimpsests Project has rendered many folios of Caucasian Albanian more legible. These are now being studied by Jost Gippert. Moreover, a very large number of erased texts are in Christian Palestinian Aramaic (CPA), the language of the theology and of the liturgy of the Melkite Christians in Palestine from the 5th to the 13th century, after which it fell into disuse. Sinai Palimpsests Project has significantly enlarged the known corpus of writing in this language, adding 19 manuscripts with Christian Palestinian Aramaic in the erased layer, some of them with previously-unknown texts of a Biblical or liturgical nature. These are now being studied by Christa Müller-Kessler.

What Can the Sinai Manuscript Collection Tell Us about Language Use?

Thanks to the Sinai Palimpsests Project, it is possible to compare the distribution of languages in three different layers, as it were, of the Monastery's library: the Old Collection, the New Finds, and the erased *scriptio inferior* of palimpsests.[26] This allows for some speculation about the different language communities of the Christian Orient whose members came to the Monastery in the Sinai through the ages and left their books in the library, as a bequest or a pious gift.[27]

It is often assumed that a monastery with such an old and important library must have had a scriptorium, but concrete evidence for scribal activity at the Sinai—let alone collaborative book production on a larger scale as implied by the term 'scriptorium'—is rather slim once the colophons are considered and contextualized. It is instructive to compare the Greek, Syriac, and Georgian manuscripts in the Old Collection, which is the best preserved. The scribal habits differ significantly according to language group and depending on the location of

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[25] *Kanon on St. Nicholas* (Sin. gr. 962, *Diktyon* 59337, ff. 183rv, 186rv), *Anthology of Psalms* (Sin. gr. 2053, *Diktyon* 60428), *Ladder of John Climacus* (Sin. gr. NF M 130, *Diktyon* 60957, f. 1rv).

[26] A more detailed discussion of the following material is found in Rapp, Secluded Place. The numbers presented here represent an updated count. Tannous, *Making of the Medieval Middle East* also engages with issues of Christian manuscript-producing communities in the Levant under Arab rule.

[27] The most recent and complete treatment of the Monastery's library and its history is Rossetto, *Three Euchologia*, 17–50, where further bibliography can be found.

copying. The Syriac scribes left the largest number of colophons that mention the place of copying (in 28% of the Syriac manuscripts currently in the Sinai), followed by the Georgians (17%) and the Greeks (8%). The Sinai as a place of copying is mentioned in 87% of the Georgian colophons, but only in 49% of the Syriac and 18% of the Greek colophons. In other words, Georgian and, to a significantly lesser extent, Syriac scribes made a point of noting the fact that they were working in the Sinai. These figures need to be seen in relation to the total number of manuscripts that survive from each of these three language groups. The result is rather slim: 15% of all Georgian manuscripts and 14% of all Syriac manuscripts in the Sinai collection were copied on site. For the Greek manuscripts, that number is minuscule: 1.5% only.

Old Collection	**Greek**	**Syriac**	**Georgian**
Total number of mss	2,319	266	86
Colophons with place of copying	189	75	15
Colophons, % of total number of mss	8%	28%	17%
Colophons with Sinai as place of copying	34	37	13
Colophons with Sinai, % of colophons	18%	49%	87%
Colophons with Sinai, % of mss	1.5%	14%	15%

Tab. 1: Frequency of annotations in Greek, Syriac and Georgian, and frequency of indications of Sinaitic provenance in the parchment manuscripts of the Old Collection of the library of the Holy Monastery of St. Catherine

The Old Collection contains manuscripts that have been collected and treasured continuously to the present day. As Father Justin Sinaites points out in his contribution to this volume, ever since the days of Egeria's visit in the late 4th century, the presence of codices with Biblical or liturgical content has been part of the history of the Monastery and of the experience of pilgrimage to the site.

Old Collection (Parchment)	**Codices and Scrolls**	**Percentage**
Arabic	601	18.05%
Armenian	1	0.03%
Caucasian Albanian	0	0.00%
Christian Palestinian Aramaic (CPA)	3	0.09%
Coptic	1	0.03%
Ethiopic	6	0.18%
Georgian	86	2.58%
Greek	2,319	69.66%
Hebrew	0	0.00%
Latin	1	0.03%
Ottoman	1	0.03%
Persian	1	0.03%
Slavonic	43	1.29%
Syriac	266	7.99%
Totals:	**3,329**	**100%**

Tab. 2: Distribution of languages in parchment objects (manuscripts, quires, fragments) in the Old Collection of the library of the Holy Monastery of St. Catherine

In the Old Collection, the largest language group is manuscripts in Greek (69.66%). It has been estimated that at least 70% of them contain liturgical texts. Following by a large margin, the next largest language representation is manuscripts in Arabic (18.05%), showing that over its long history the Monastery catered to the liturgical needs of people who were steeped in what became the local language from the 7th century. Next in importance is Syriac (7.99%), the language of Melkite Christians from Egypt to the Euphrates. Manuscripts in Georgian constitute 2.58% of the total.

The New Finds contain discarded and neglected manuscript materials that became known in 1975. This depository was probably started in 1734, when Archbishop Marthales moved the book collection to a newly designated library space. Those manuscripts that were no longer in use were left behind and apparently forgotten in the Tower of St. George. They were (re-)discovered in 1975 when debris was cleaned up four years after a fire in St. George's chapel. The New Finds largely consist of manuscript material in less than pristine condition, often well worn by frequent use, which may have been the reason for its deposition in this location. Entire codices are rare. More frequent are quires, bifolios, folios, and a large number of fragments. As a result of the discovery of the New Finds, the library holdings were increased by more than 30%, especially in the languages of Oriental Christianity. There were some 1200 manuscripts, parts of manuscripts, and fragments, including 423 manuscript items in Greek (often of early date and thus preserving precious evidence of different styles of majuscule writing), a very large number of items in Georgian (99), closely followed in number by those in Syriac (91), with Arabic following at some distance (70), and a significant number of items in Latin (39).

	Old Collection (Parchment)	**Percent of codices and scrolls**	**New Finds** (Parchment)	**Percent of mss. objects, incl. fragments**[28]
Arabic	601	18.05%	70	8.93%
Armenian	1	0.03%	0	0.00%
Caucasian Albanian	0	0.00%	0	0.00%
Christian Palestinian Aramaic (CPA)	3	0.09%	18	2.30%
Coptic	1	0.03%	0	0.00%
Ethiopic	6	0.18%	2	0.26%
Georgian	86	2.58%	99	12.63%
Greek	2,319	69.66%	423	53.95%
Hebrew	0	0.00%	1	0.13%
Latin	1	0.03%	39	4.97%
Ottoman	1	0.03%	0	0.00%
Persian	1	0.03%	0	0.00%
Slavonic	43	1.29%	41	5.23%
Syriac	266	7.99%	91	11.61%
Totals:	**3,229**	**100%**	**784**	**100%**

Tab. 3: Distribution of languages in parchment objects (manuscripts, quires, fragments) in the Old Collection and the New Finds of the library of the Holy Monastery of St. Catherine

The absolute numbers for the New Finds given here should be used with caution, as the objects that are being counted are no longer entire codices, but objects in various degrees of completeness.[29] Intact codices are rare among the New Finds. Much more frequent are codices without binding, individual quires or several quires stitched together, bifolia and individual folia or even fragments of folia. The noticeable presence of Latin, for example, is partially due to the fact that Latin parchment folios were cut up for use as binding strips, in which form they are now preserved.[30] Still, the percentages give some impression of the relative language

[28] It must be noted that all 18 CPA items, and 76 of the Syriac items in the New Finds, are fragments.

[29] Within the context of the Sinai Palimpsests Project, we have adopted the term 'manuscript object' to denote a distinct codicological unit that carries a catalogue number. This may be an entire codex, but can also be one or several quires, or a number of fragmented parchment pieces preserved in an envelope.

[30] At present, the Monastery's holdings include two codices and about 50 objects (including fragments and binding strips) written in Latin, many of them, as Michelle Brown has written, copied very early, in the 6th to 7th century, by scribes trained in the traditions of Rome, Ireland, and Britain. See most recently Brown, Imagining, Imaging; Brown, Bridge in the Desert; Brown, Early Medieval Picture Cycles; and Brown's contribution in the present volume.

frequency within the New Finds. The largest language representation after Greek is no longer Arabic, but Syriac. This figure may simply be due to the large number of fragments in that language.

Arabic discards, by contrast, are exceedingly rare, suggesting that texts and manuscripts in that language continued to be used and valued, rather than being discarded. Compared to the Old Collection, there is a significantly higher percentage of manuscript objects in Georgian. Does this mean that manuscripts carrying text in Georgian became so disheveled by frequent use over time that they were given an honorable discharge? Also striking is the high percentage of manuscript objects in Christian Palestinian Aramaic. Their presence in this depository can be explained by the fact that CPA ceased to be used in the 13th century. The New Finds thus offer a different perspective, from a different block of time, on the languages represented in the Monastery through its manuscripts. It is safe to assume that the people who brought these books or made use of them in the preceding centuries were conversant in these languages.

Palimpsested material represents the earliest layer in our investigation of language use. Table 4 below illustrates the languages present in the erased texts of the 74 manuscript objects from the Old Collection and the New Finds that have been imaged by the Sinai Palimpsests Project so far. In order to facilitate comparisons with the Old Collection and the New Finds, two different counting methods are applied here to the different languages. First, the absolute number of manuscript objects and their percentage containing erased languages is given. Second, to account for the varying state of preservation and fragmentation, the more significant numbers are the folio counts of undertext languages, both in absolute numbers and by percentage.[31]

	Old Collection (Parchment)	**Percent of codices and scrolls**	**New Finds** (Parchment)	**Percent of mss. objects, incl. fragments**	**Palimpsests** (74 objects, SPP March 2017)	**Percent of mss. objects**	**Erased sides** (rectos, versos)	**Percent of erased sides**
Arabic	601	18.05%	70	8.93%	8	7.55%	436	6.29%
Armenian	1	0.03%	0	0.00%	6	5.7%	118	1.70%
Caucasian Albanian	0	0.00%	0	0.00%	2	1.9%	276	3.98%
Christian Palestinian Aramaic (CPA)	3	0.09%	18	2.30%	20	18.9%	479	6.91%
Coptic	1	0.03%	0	0.00%	1	0.9%	2	0.03%
Ethiopic	6	0.18%	2	0.26%	1	0.9%	34	0.49%
Georgian	86	2.58%	99	12.63%	10	9.4%	710	10.25%
Greek	2,319	69.66%	423	53.95%	32	30.2%	3,058	44.14%
Hebrew	0	0.00%	1	0.13%	0	0.0%	0	0.00%
Latin	1	0.03%	39	4.97%	3	2.8%	83	1.20%
Ottoman	1	0.03%	0	0.00%	0	0.0%	0	0.00%
Persian	1	0.03%	0	0.00%	0	0.0%	0	0.00%
Slavonic	43	1.29%	41	5.23%	2	1.9%	115	1.66%
Syriac	266	7.99%	91	11.61%	21	19.8%	1,617	23.34%
Totals:	**3,229**	**100%**	**784**	**100%**	**Note**[32]	**100%**	**6,928**	**100%**

Tab. 4: Distribution of languages in parchment objects (manuscripts, quires, fragments) in the Old Collection, the New Finds and in the erased undertext of the library of the Holy Monastery of St. Catherine

[31] Coptic appears to such a small degree that it is not considered further here.

[32] The sum of the languages attested in the erased undertexts of the 74 mss. imaged during the Sinai Palimpsests Project is higher than 74 because in several cases one manuscript object preserves undertexts written in more than one language. However, the occurrence of a given language in the erased layers is indicated only once even if, for instance, one manuscript object preserves five or six undertexts written in the same language.

Greek remains the dominant language. In the Old Collection and in the New Finds, this is obvious from the survival rate of Greek manuscripts (69.66 % and 53.95%, respectively). That Greek material was widely available emerges from the fact that erased Greek undertext appears in 32 different manuscript objects. Still, there is a certain reluctance (compared to the later layers) to erase Greek text which would still have been considered valuable (44.14%). Also targeted for erasure during the Middle Ages were texts in Syriac (23.34%) and Georgian (10.25%), probably due to the availability of material in that language. Christian Palestinian Aramaic (6.91%) as well as Caucasian Albanian (3.98%) were erased, as has been noted above, due to the fact that these languages were becoming obsolete.[33] The importance of Arabic as a language of Christian theology and worship is evident here from the reluctance to erase it (6.29%). What remains unknown is the origin of the erased writing material. Equally uncertain in most cases is the location where it was reused for the copying of a new manuscript. In view of the observations illustrated in Table 1 above, we must refrain from automatically assuming that the ample manuscript material preserved in the Sinai was also copied there. One possible clue regarding the locations where writing material was erased and where it was reused may come from the relation of overtext language to undertext languages in any given manuscript object.

What is the Correlation of Erased Language and Overtext Language? What Might this Tell Us about Language Communities?

The answer to this question may allow us to see which language groups were in closest interaction with each other. Or, to be more precise, who shared palimpsested parchment leaves with whom.[34] The figures given in Table 5 should be treated with caution, as they may be overly generous. The count of languages is based on the Text Layer Groupings indicated in KatIkon, and does not distinguish between full manuscript sides and stubs, nor does it take into account double or triple palimpsest layers.[35] Still, it gives some impression of the languages in the erased layer and the overtext that tend to cluster together.

Erased Language	**Number of manuscript objects (recto and verso sides) with erased language**	**Overtext language: number of manuscript objects**	
Arabic	8 (436 sides)	Arabic	3
		Georgian	2
		Greek	3
Armenian	6 (118 sides)	Georgian	2
		Syriac	4
Caucasian Albanian	2 (276 sides)	Georgian	2
CPA	20 (479 sides)	Arabic	2
		CPA	7
		Georgian	4
		Greek	3
		Syriac	4
Ethiopic	1 (34 sides)	Greek	1
Georgian	10 (710 sides)	CPA	1
		Georgian	9

[33] Brock, Sinai notes the frequent appearance in Georgian manuscripts of the last decades of the 9th and the 10th century of reused material in Syriac and CPA. This suggests that during this period Georgian and Syriac monks lived side by side at Mar Saba, in Jerusalem and its environs, and in the Sinai.

[34] The following section is based on Rapp, Secluded Place, with updates.

[35] For an explanation of KatIkon and the terminology developed for it, see the contribution of Doug Emery in this volume.

Erased Language	Number of manuscript objects (recto and verso sides) with erased language	Overtext language: number of manuscript objects	
Greek	32 (3,058 sides)	Arabic	4
		Georgian	5
		Greek	19
		Syriac	4
Latin	3 (83 sides)	Arabic	1
		Greek	1
		Slavonic	1
Slavonic	2 (115 sides)	Slavonic	2
Syriac	21 (1,617 sides)	Arabic	4[36]
		Georgian	1
		Syriac	16

Tab. 5: Erased languages in relation to overtext languages

As is to be expected, the overtext and the undertext languages are often the same, suggesting that language communities actually used the material they had at hand in the largest quantities.

But more can be said. Some language communities seem to have been rather closed. Taking the undertext-to-overtext relation first: Slavonic appears only under Slavonic; Caucasian Albanian appears only under Georgian; Ethiopic appears only under Greek. But Latin, rather surprisingly, appears under Arabic, Greek, and Slavonic.

We can also invert that relationship and look at the textual and scribal communities that used palimpsested sheets. The overtext-to-undertext relationship offers some insights into the community that applied the *scriptio superior*, revealing its multilingual character through the manuscript material available at hand for reuse. The greatest language variety of palimpsested material is found among the Georgians. Under Georgian overtext, no fewer than seven languages are represented: Arabic, Armenian, Caucasian Albanian, CPA, Georgian, Greek, and Syriac. The Armenians by contrast, Georgia's neighbours in the Caucasus, do not seem to have left any palimpsested material at all among the Armenian manuscript holdings in the Monastery's library.

Greek and Arabic scribes in Christian contexts may have been working under similar conditions as regards their access to writing material: five different undertext languages are found under Greek and also under Arabic overtexts—they both write on top of Greek, Arabic, CPA, Syriac, and Latin. In addition, we have a rare instance of Greek text over Ethiopic. This similarity in access to palimpsested material may suggest that Greek and Arabic manuscript production occurred in the same cultural and linguistic environment.

The Syriac scribes used recycled sheets from four languages, i.e. Armenian, CPA, Greek, and Syriac. Only two different languages are represented under Slavonic (Slavonic and Latin). Christian Palaestinian Aramaic scribes wrote only over texts in their own language.

These observations offer interesting new material for the numerous interactions between people from the different linguistic and cultural traditions of the Christian world. There must have been hotspots for such interaction, not just at the Monastery in the Sinai, but also at Mar Saba and the Holy Land in general, which was a magnet for pilgrims from far and wide, and home to many monasteries.[37] Could these be the places of origin for at least some of the palimpsest manuscripts that are now in the Sinai? Even if we take into account that the majority of manuscripts, including the palimpsests, were not copied at the Monastery itself, but brought there by pilgrims and other pious visitors, these observations offer ample evidence for the frequent interactions between people from different languages and cultures across the Christian world.

[36] Sin. ar. 514, ff. 47r and 52v are double palimpsest, the upper erased layer is Greek, the lowest erased layer Syriac. This, along with the other cases of double and triple palimpsest (which are not considered here), deserves further in-depth study.

[37] See the forthcoming volume edited by Daniel Galadza and Joseph Verheyden, *The Lavra of St. Sabas: Liturgy and Literature in Communities and Contexts*, including Binggeli, Writing in Syriac and Christian Palestinian Aramaic at Mar Saba.

Many questions about the dissemination of palimpsested sheets can only be answered speculatively. Was there a wide market for such second-grade writing material, as will be suggested again below on the basis of the circulation of erased parchment across religious boundaries? What was the distance over which it was traded? Or should we assume that the erasure of undertext occurred in the same region as the application of overtext? Giulia Rossetto has assembled some evidence for the West-East movement of liturgical manuscript material, as Greek texts of Southern Italian origin were later over-written in the region of Syria-Palestine, but it remains unclear in what location the erasure of the undertexts occurred. If the Italo-Greek material was already removed when the sheets reached the Levant, this would indicate a wide geographical range for the trade in recycled parchment. Alternatively, the Italo-Greek manuscripts may have been preserved in the possession of individuals or monastic libraries in the East, and only later turned into second-grade writing material.[38]

RELIGIOUS COMMUNITIES AND THEIR USE OF PALIMPSESTS: A COMPARISON

Texts that are non-Christian are exceedingly rare in the Sinai undertexts, and non-existent in the overtexts included in the Sinai Palimpsests Project. The erased pagan texts in Greek and Latin from classical antiquity have already been mentioned. One of the erased texts in Sin. ar. NF 8 is a sales deed from Ramla of the year 841, written in Arabic. It contains the Muslim dating system and an invocation. There is a single instance of a Jewish text that has an intriguing history: under a Greek liturgical text copied in the 14th century (Sin. gr. 930, *Diktyon* 59305), Alexander Treiger has identified an Arabic version of Genesis and Exodus, copied in the 10th or 11th century. This was probably a translation from Hebrew into Arabic made for an Arab-speaking Jewish community in North Africa. This is a very rare presence of Old Testament text from the Jewish tradition that owes its survival to a Christian context. How, where, and when did these parchment folios from a different religious tradition and a far-away region end up on the recycling pile so that three centuries later a Greek liturgical text, now preserved in the Sinai, could be written on top?

This raises a final question, that of religious preferences in the practices of parchment recycling. As has been shown above, the reuse of parchment followed distinctive patterns depending on language communities. Some had access to material with a very wide range of erased languages, while others had rather limited choices. To gain a better understanding of the patterns of circulation of erased parchment according to religious affiliation, it is possible to draw upon manuscript depositories of Jewish and Muslim communities that include palimpsested materials: the Cairo Genizah of the Ben Ezra Synagogue, and the Qubbat al-Khazna of the Umayyad Mosque in Damascus, as discussed by Ronny Vollandt in this volume.[39] The Sinai New Finds represent an analogous Christian cache of manuscripts that were piled up and neglected in one place over a long period of time. The table below offers a comparison between the palimpsests contained in these Jewish, Christian and Muslim depositories.[40]

The first feature to be noted in Table 6 when comparing the undertexts to the overtexts is a significant narrowing in the diversity of languages over time: in the Jewish case, from eight erased languages to two overtext languages; in the Christian case from ten to six; and in the Muslim case from five to three. But this is not the whole picture. It must also be noted that the Jewish and Muslim communities tended to use erased texts from outside their religion. Indeed, all three religious communities used largely parchment with Christian texts for erasure. Perhaps parchment with Christian text was the most widely available? It is unlikely that the Jews who generated the materials deposited in Cairo, or the Muslims whose recycled parchments ended up in Damascus, had manuscripts with Christian texts ready at hand in their own libraries for recycling. We must assume instead that they received the palimpsested sheets already prepared for reuse. This would be a strong indication for the circulation of palimpsests as a commodity. It must have been Christians who made the parchment folios available for erasure, and Christians who offered the second-grade writing material for sale and reuse by their Jewish and Muslim contemporaries.

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[38] Rossetto, *Three Euchologia*, 345–386, discussing the erased texts of Sin. gr. 966 (*Diktyon* 59341).

[39] See now also D'Ottone Rambach *et al*., *The Damascus Fragments*.

[40] The information on the Cairo and Damascus material is based on the contribution by Ronny Vollandt in this volume. The information on the Sinai New Finds was kindly provided by Giulia Rossetto, building on work by Damianos Kasotakis.

	Cairo, Ben Ezra Synagogue, Genizah	**Sinai, St. Catherine's Monastery, Sinai New Finds (studied so far in SPP)**	**Damascus, Umayyad Mosque, Qubbat al-Khazna**
Total number of objects with palimpsest	105	54	36
Religion of erased texts	Non-Jewish (85%)	Christian (83%)	Non-Muslim (100%)
Erased languages	CPA (58%) Hebrew/Judeao-Arabic and Hebrew/ Greek and Hebrew (15%) Greek (14%) Syriac (6%) Georgian (4%) Arabic (3%) Coptic (2%) Latin (2%)	Greek (23%) Georgian (10%) Syriac (21%) CPA (26%) Caucasian Albanian (3%) Armenian (7%) Slavonic (3%) Latin (4%) Arabic (3%) Ethiopic (1%)	CPA (56%) Greek (33%) Syriac (6%) Coptic (3%) Hebrew (3%)
Date of erased script	Mostly 5th–6th c.	Mostly 5th–6th c., 9th–12th c.	--
Date of application of overtext	Mostly prior to 1000	9th c. and later	--
Religion of upper texts (most prevalent content in %)	Jewish (100%, Palaestinian, of which Talmud 36%)	Christian (100%, of which liturgical 52%)	Muslim (92%, of which Quran 28%) Christian (8%)
Upper text languages	Hebrew/Hebrew and Aramaic (96%) Judaeo-Arabic/Judaeo-Arabic and Hebrew (4%)	Georgian (22%) Syriac (35%) Greek (18%) Slavonic (4%) Arabic (7%) CPA (15%)	Arabic (86%) Greek (8%) Syriac (6%)

Tab. 6: Caches of palimpsested parchment and religious distribution of erased texts

The next question to be asked is that of the radius of such trade. This is a question for which an answer can be attempted with regard to the Sinai. As our comparison shows, the large urban centres and trading hubs of Cairo and Damascus show less diversity in undertext languages than the desert monastery at the tip of the Sinai peninsula. This can only mean that the removal of the original texts that are now preserved in the erased layers of the Sinai New Finds must have occurred in locations where this kind of material was widely available, namely monasteries and other Christian centres which were frequented by people from these different language groups. The first place that comes to mind is the Holy Land with its many monasteries that attracted pilgrims and monks from all areas of Christendom. Indeed, it has been shown for the 9th to the 14th centuries that there was a regular flow of monks and manuscripts from the Holy Land to the Sinai.[41] It might also be argued that the palimpsests were created in the Sinai itself, for reuse on the spot. This is doubtful, however, in view of the fact that only a relatively small proportion of manuscripts that are now in the library at St. Catherine's show clear evidence of having been copied on site, as has been noted above. We are thus left with the conclusion, tentative and provisional as it might be, that the trading of recycled parchment occurred within regional networks. In the case of the Jewish and Muslim communities, it also took place across religious boundaries.

The library of the Holy Monastery of St. Catherine reflects in its holdings the many people who came there to experience for themselves the mountaintop where Moses had stood, the Burning Bush where Moses heard the voice of God, and the relics of St. Catherine of Alexandria. These people came as pilgrims and as monks from all over the Christian world. The closest connections were with the Holy Land and the many monasteries there, which were part of the pilgrimage route. In the Sinai, in Jerusalem, and also at the Monastery of Mar Saba, which is less than a day's journey from the Holy City, not all monks had Greek as their native language.

[41] Rapp, From the Holy City.

Some monks came from different cultures and language groups and worshipped either together or side by side. Thanks to the Sinai Palimpsests Project, we have been able to dig deeper into the history of these multilingual monastic communities. We have been able to travel back in time beyond the moment when the manuscripts they most recently used were created, by looking at the history of the recycled sheets on which these were written. In the process, we have found a treasure trove of new texts, new languages, new scripts, and new insights into the use of palimpsests, that give us a deeper appreciation of the Monastery's rich cultural and religious role through the ages.

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Giulia Rossetto

Classical Texts among the Palimpsests of the Monastery of St. Catherine (Sinai): An Overview

INTRODUCTION

Most of the written cultural heritage of the Graeco-Roman world has reached us thanks to the diligent copying activity of Byzantine scribes, who continued to transmit works from classical antiquity in manuscripts. However, in a number of cases, classical texts in Greek and Latin, their translations into other languages, as well as texts in languages such as Syriac and Arabic inspired by Greek or Latin classical works, survive for the opposite reason; namely, as the result of the attempt to get rid of them. This is what happens in palimpsests. In this article, I will present the classical texts which have come to light in the erased layers of the palimpsests preserved at the Monastery of St. Catherine located in the Sinai peninsula.

We are currently aware of 172 manuscript objects with individual shelfmarks which are entirely or partially copied on recycled parchment at St. Catherine's.[1] Their *scriptiones inferiores* were written in eleven different languages: Arabic, Armenian, Caucasian Albanian, Christian Palestinian Aramaic (CPA), Coptic, Ethiopic, Georgian, Greek, Latin, Old Church Slavonic, and Syriac.[2] Since the library of the Monastery comprises 4,549 shelfmarks (this count includes the manuscripts from both the Old Collection and the New Finds), this means that at least 3.7% of the total is palimpsest.[3] Out of these 172 palimpsests, 74 were imaged and studied during the Sinai Palimpsests Project of the Early Manuscripts Electronic Library (EMEL), with which I was affiliated as a Research Associate. As a result, a total of 307 'textual units' or 'UTOs' ('undertext objects')[4] have been identified in the erased layers of the 74 palimpsests. A textual unit or UTO was defined by the Sinai Palimpsests Project as a distinct work with the same layout, usually copied by the same scribe in the same time period and place, and preserved in a distinct manuscript object as defined by shelfmark.[5] A single textual unit does not necessarily correspond to one original manuscript: several textual units might be *membra disiecta* of one and the same 'original manuscript'.

The work of text and script identification was undertaken by a large international group of affiliated scholars who are experts in the relevant languages. The observations I will present in what follows are based on this collective work.[6] The images of the 74 palimpsests are free to access online.[7]

While the majority of the 307 textual units consist of Christian works (257 = 83.71%), a smaller percentage of known and unknown works from classical antiquity is also present. There are eleven of these in total (3.58%). Of the remaining erased undertexts, a small number are of documentary nature (4 = 1.3%), while a significant number of textual units are still unidentified (35 = 11.4%) (Fig. 1).

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[1] Last updated: 22.01.2021. This number does not include the over 100 palimpsest fragments from the fragments collection of the Monastery, which were surveyed and documented by Damianos Kasotakis from March to May 2020.

[2] On the language distribution among the overtexts and the undertexts, see Rapp, Secluded Place or Global Magnet? and Rapp's contribution to this volume.

[3] The exact total number of Sinai manuscripts was indicated to me by Father Justin Sinaites (personal communication, February 2021). See also Frøyshov, Les manuscrits de la bibliothèque du Sinaï, 61.

[4] The latter term was used during the Sinai Palimpsests Project.

[5] As far as the Sinai palimpsests are concerned, only in few cases was one textual unit or UTO copied by more than one hand. This happens for texts of documentary nature, such as those extant as *scriptiones inferiores* in Sin. ar. NF 8 (*Diktyon* 58318).

[6] The Appendix indicates the names of the scholars who identified the texts which I take into consideration in this article.

[7] The images are accessible, on registration, at the Sinai Palimpsests Project research site: http://sinaipalimpsests.org/ (accessed 01.07.2023).

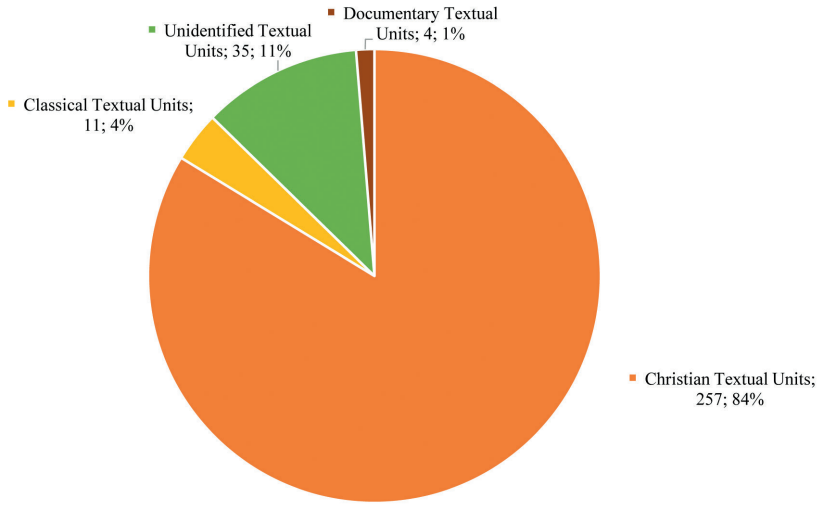

Fig. 1: Content of the 307 textual units preserved within the 74 palimpsest manuscripts which were imaged and studied during the Sinai Palimpsests Project

CLASSICAL TEXTS AS *SCRIPTIONES INFERIORES*

Eleven classical texts have so far been identified among the Sinai palimpsests.[8] They are written in three different languages: seven in Greek, three in Syriac, and one in Latin. They appear in the erased layers of six extant manuscripts. Interestingly, as far as date of copying is concerned, they are clustered according to language (Fig. 2). All the Greek texts were copied around the 5th–6th century, the one text in Latin dates to the 7th century, and the three in Syriac to the 8th and 9th centuries. Seven texts are of medical or botanical nature, one preserves letters, one a fragment of a novel. In addition, there is a philosophical text, and the final text is of mythological nature. Eight out of these eleven (i.e. well over half) are completely new texts: they had either been unknown to scholars or—in the case of translations—had not previously been attested in a specific language (Fig. 3).

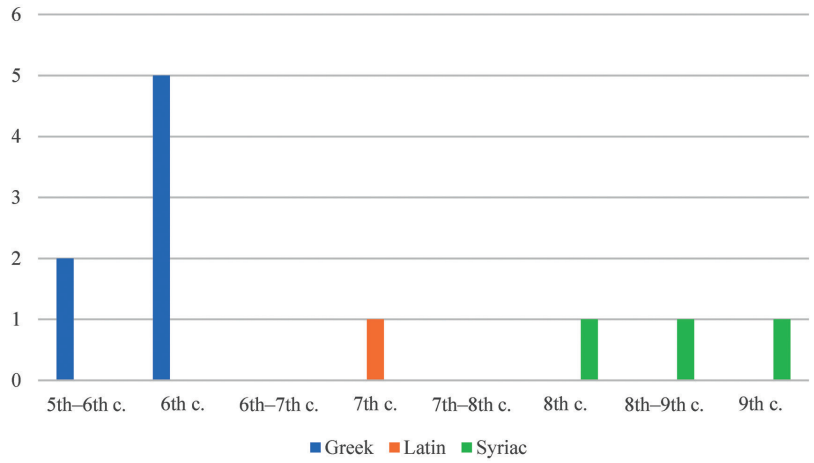

Fig. 2: Date of copying of the eleven classical texts preserved in the 74 palimpsests

[8] This number refers exclusively to the classical texts which were identified among the 74 palimpsests investigated during the Sinai Palimpsests Project. Once the entire collection of palimpsests preserved at St. Catherine's will be studied, the number of classical texts will very probably increase. Moreover, this number also does not include the classical texts in palimpsests that were originally preserved at St. Catherine's, but are now found in manuscripts collections around the world. An example is the Menander palimpsest (Vat. sir. 623 [*Diktyon* 69457]), now in the Vatican Library (on this discovery see D'Aiuto, Graeca in codici orientali della Biblioteca Vaticana). This manuscript was imaged by the Early Manuscripts Electronic Library in 2014: http://emel-library.org/projects-3/ (accessed 01.07.2023). Therefore, the number of preserved classical texts from Sinai would increase if we were to include the Sinai diaspora manuscripts.

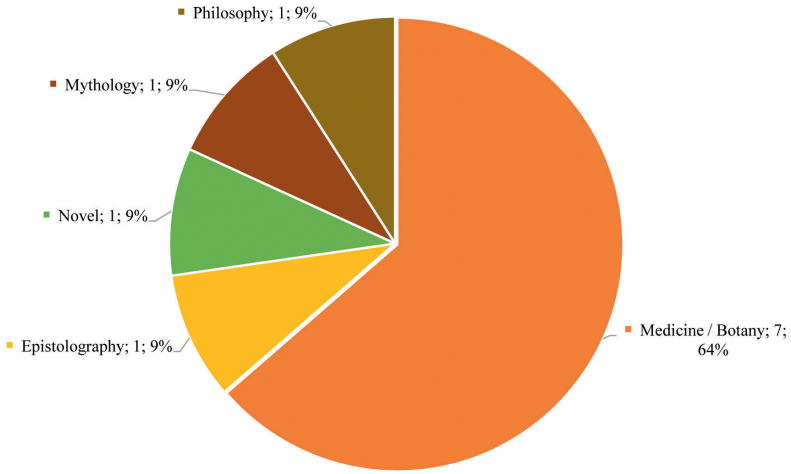

Fig. 3: Content of the eleven classical texts preserved within the 74 palimpsest manuscripts which were imaged and studied during the Sinai Palimpsests Project

I will consider each text individually, by language: first Greek, then Latin, and finally Syriac. I will not present any new text editions here, but rather offer an overview of each text, including codicological and palaeographical details. A schematic summary of all collected information for each text can be found in the Appendix at the end of the article.

Classical Texts in Greek

From a total of 92 Greek textual units, seven classical texts were recovered as part of the Sinai Palimpsests Project. This represents 7.6% of the total.[9] They are clustered within the erased texts of two manuscripts: six are preserved in Sin. ar. NF 8 (*Diktyon* 58318), and one in Sin. ar. NF 66.[10]

Three of them are previously-known classical texts from the *corpus Hippocraticum*. These are found in ten folios of Sin. ar. NF 8 (ff. 8, 9, 40, 41, 46, 47, 50, 53, 58, 61).[11] The surviving passages come from the seventh book of the *Epidemics* (*De morbis popularibus*), from the first book of the *Regimen* (*De diaeta*), and from the *Letters* (*Epistulae*). In the folios containing the *Epidemics*, the *scriptio inferior* runs perpendicular to the *scriptio superior*. This means that one folio of the original manuscript was turned by 90° or 270°, folded in two, and reused as a new bifolio. The folios with passages from the *Letters* and the *Regimen* were also treated in the same way. However, in addition to this, the edges of the original folios were cut into strips and these strips were then sewn together. This is visible on ff. 8 and 9 (Fig. 4).

The texts of the *corpus Hippocraticum* are arranged in two columns of 42/43 lines (reconstructed number). They are written in Biblical majuscule, by two different hands. According to Agamemnon Tselikas and Nigel Wilson, the script dates to the 6th century.[12] In the table below, I list the preserved textual segments. This is followed by the reconstruction of the undertext folio order.[13] This reconstruction shows that all passages from the *Epidemics* originated from one single folio of the original medical manuscript. Also, the fragments

[9] For an overview of all the Greek Sinai palimpsests investigated during the Sinai Palimpsests Project see Rossetto, *Greek Palimpsests at Saint Catherine's Monastery*, 37–94.

[10] Reference catalogue entry for Sin. ar. NF 8 is Meimaris, *Κατάλογος*, 24. See also Boudalis and Rossetto, Colour Mapping of Sin. ar. NF 8. For Sin. ar. NF 66 the reference catalogue is Meimaris, *Κατάλογος*, 35.

[11] This text was identified during the Sinai Palimpsests Project by Agamemnon Tselikas and Nigel Wilson, and further investigated from a codicological perspective by Giulia Rossetto.

[12] On the dating criteria for manuscripts copied in Greek majuscule letters, see Pasquale Orsini's contribution in this same volume, fn. 4.

[13] This reconstruction is my own, based on preliminary text identification by Agamemnon Tselikas. Passages are given on the basis of Littré's edition: Littré, *Œuvres complètes d'Hippocrate*.

containing the *Letters* come from one single original folio, while those from the *Regimen* originate from two folios of the original manuscript. Thus, a total of four original folios from the *corpus Hippocraticum* have come down to us.

Fig. 4: Sin. ar. NF 8, f. 9r: Hippocrates, *Letters* 10,19–31 (ed. Littré) (top piece); Unidentified text (middle piece); Hippocrates, *Regimen* I 17,6 – 18,11 (ed. Littré) (bottom piece). Processed image by Keith Knox: KTK_pseudo_avgUV-VIS
(© St. Catherine's Monastery, Sinai, Egypt)

Sin. ar. NF 8: Hippocrates, *Epidemics* VII 1,59.8 – VII 1,77.4			
Folio	Passage	*Incipit*	*Desinit*
50r	VII 1,60.4 – 1,62.1 (col. a)	] μετὰ τοὺς παροξυσμοὺς …	… Ἀλκμᾶνι ἐκ νεφριτικῶν […] [
	VII 1,63.2 – 1,64.9 (col. b)	] δὲ εἰρίῳ …	… ἐπιχέαντα ἐπ[αλείψαντα
50v	VII 1,67.10 – 1,68.7 (col. a)	] […] σιδίων· καὶ οὔρου …	… συνήνεγκεν ἀλλὰ σήσα[μον
	VII 1,73.1 – 1,77.4 (col. b)	] […] σπάσματος ἢ πληγῆς …	… πνεῦμα πυκνὸν [
53r	VII 1,64.9 – 1,67.4 (col. a)	καταπλ]άσσειν ἐπὶ …	… κατέχειν ἠδύνατο οὐδὲ [
	VII 1,68.7 – 1,72.2 (col. b)	σήσα]μον πίνειν καθαρὸν …	… κατὰ ῥῖνας χωρή[σῃ
53v	VII 1,59.8 – 1,60.4 (col. a)	] […] ῥηϊδίως πρῶτον …	… καὶ ὅταν λήγωσι [
	VII 1,62.1 – 1,63.2 (col. b)	] […] κάτω καὶ αἵματος …	… μὴ κλύζειν διακα[θαίρειν
Undertext folio order: - original *recto*: 53v (col. a), 50r (col. a), 53v (col. b), 50r (col. b) - original *verso*: 53r (col. a), 50v (col. a), 53r (col. b), 50v (col. b)			

Sin. ar. NF 8: Hippocrates, *Regimen* I 17,6 – 30,11			
Folio	Passage	*Incipit*	*Desinit*
8r bottom	I 25,9 – 26,3	ἀ]νθρώπου …	… καὶ πρότερον οὐ[
8v bottom	I 18,11 – 20,1	] μιμέεται δια[γινώσκουσα …	… χρυσίον ἐργάζ[ονται
9r bottom	I 17,6 – 18,11	ἐόν]τα συμφέρει τ[ῇ φύσει …	… κρού]σματα ἐν μου[σικῇ
9v bottom	I 24,13 – 25,9	αὐτ]ὸν μὴ εἶναι τὸν …	… ψ]υχροῦ τοῦ σώ[ματος
40r	I 28,11–21 (col. a)	] ἄρσεν ἀποκριθῇ …	… τρόπον τῷ προ[τέρῳ
	I 29,5 – 30,1 (col. b)	αὐ]ταὶ ἦν δὲ τὸ μὲν ἀπὸ …	… ὅδε ὁ λόγος δηλώσει [
40v	I 26,3 – 27,2 (col. a)	οὐ]δὲν ἕτερον ἑτέρου …	… ὕδατος μᾶλλον ἀπὸ ψυ]χρῶν
	I 27,12 – 28,1 (col. b)	ἀ]σθενείην τοῦ πυρ[ὸς …	… καὶ τὸ θῆλυ [
41r	I 24,5–13 (col. a)	] κρίνουσι ἕνα ἐξ ἁπάντων …	… λέγειν ἄλλα δὲ ποιέ[ειν
	I 25,9 – 26,3 (col. b)	σώ]ματος κατ[αναλίσκεται …	… πάν]τα καὶ αὔξετ[αι
41v	I 18,11 – 20,1 (col. a)	Γλῶσ]σα μουσι[κὴν …	… κόπτουσι [
	I 22,1 – 23,2 (col. b)	] οὔτε πρώσω προχωρέει …	… σημεῖα ἀνθρωπίνης φωνῆς [
46r	I 17,6 – 18,11 (col. a)	] φύσει. Μου[σικῆς …	… τὰ μὲν ἄνω [
	I 20,1 – 22,1 (col. b)	] πλύνουσι, τήκουσι πυρὶ …	… τὰ ὑγρὰ ξηραίνων. Κεραμέ[ες
46v	I 23,2 – 24,4 (col. a)	] δύναμις τὰ παροιχόμενα …	… πολλῶν ἀφροσύνης θε[ῶνται
	I 24,13 – 25,8 (col. b)	ποιέ]ειν καὶ τὸν αὐ[τὸν …	… κι]νήσιος κα[
47r	I 27,2–12 (col. a)	ψυ]χρῶν καὶ ὑγρῶν …	… συνιστάναι δι᾽ ἀ[σθενείην
	I 28,1–10 (col. b)	] πρὸς ἄλληλα διότι …	… τῆς ἔπειτα. Ἦν δὲ [
47v	I 28,21 – 29,5 (col. a)	] μειοῦται γίνονται …	… δὲ κόσμιαι δὲ καὶ αὐ[ταί
	I 30,2–11 (col. b)	γυναι]κὸς ἡ φύσις …	… ἀμφοτέροις ἄρσενα γεννᾶσθαι [
Undertext folio order: - original *recto*: 9r bottom+46r (col. a), 8v bottom+41v (col. a), 46r (col. b), 41v (col. b) - original *verso*: 46v (col. a), 41r (col. a), 46v (col. b)+9v bottom, 41r (col. b)+8r bottom - original *recto*: 40v (col. a), 47r (col. a), 40v (col. b), 47r (col. b) - original *verso*: 40r (col. a), 47v (col. a), 40r (col. b), 47v (col. b)			

Sin. ar. NF 8: Hippocrates, *Letters* 3 – 7, 9 – 10, 25			
Folio	Passage	*Incipit*	*Desinit*
8r top	3,1 – 4,4	] Βασιλεὺς βασ[ιλέων …	… ὑπάρ]χους κελεύων [
8v top	10,6–18	illegible	… τὴν ἀπειρίην [
9r top	10,19–31	] τὸ χρῶμα …	illegible
9v top	4,4 – 6,3	] ὅσα βούλει διδόν[αι …	… χρυσοῦ πλέον δύν[αται
58r	3,1 – 4,4 (col. a)	]ν μέγας Ἀρταξ[έρξης …	… σοι ἀργύριον καὶ [
	7,3 – 9,1 (col. b)	] ἣν ἔπεμψας ἐπιστολὴν…	… ἀποκρίνασθαι τοῖς [
58v	25,4–17 (col. a)	] ὅτε δὲ καὶ λοιμοῦ …	… τῷ δήμῳ [
	10,6–18 (col. b)	νενόση]κεν, ὥστε φόβος …	… καὶ Δημοκρίτους [
61r	25,17–23; 10,1–6 (col. a)	] δημοσίᾳ καθάπερ Ἡρακλέα …	… σοφίης νενόση[κεν
	10,19–31 (col. b)	συνδιεφθο]ρὼς τῇ γνώμῃ …	… θεραπεύσεις βουλ[ὴν
61v	4,4 – 6,3 (col. a)	] καὶ πέμπειν …	… δύν[αται. Ἔρ̣ρωσο.
	9,2–11; 25,1–4 (col. b)	οὔτ]ε Ἡρακλέους οὔτε …	… ἐνδέδεικται τοῖς Ἕλλησι [
Undertext folio order: - original *recto*: 8r top+58r (col. a), 9v top+61v (col. a), 58r (col. b), 61v (col. b) - original *verso*: 58v (col. a), 61r (col. a), 58v (col. b)+8v top, 61r (col. b)+9r top			

Since the oldest extant codices containing Hippocratic works date back to the late 9th–early 10th centuries, the Sinai palimpsested folios, even though fragmentary, are exceptionally important, since they predate these attestations by about four centuries.[14] Sections from all three Hippocratic works are extant in papyri from the 3rd century BCE onwards.[15] However, the passages that are readable in the Sinai folios from the *Epidemics* and the *Regimen* represent the very first direct attestation for those sections. The same can be said for the passages from *Letters* 7, 9, 10, 25, while for *Letters* 3–6 we have older attestations on papyri from Oxyrhynchus (P. Oxy. IX 1184 = Brussels, Musées Royaux E 6010 Vo [LDAB 1291])[16] and from the Arsinoite Nome (Berlin, Staatliche Museen P. 21137 [LDAB 1296] + P. 6934 [LDAB 1296]), dating respectively to the 1st and to the 2nd century.

In addition to the above-mentioned passages from Hippocratic works, Sin. ar. NF 8 preserves two further medical texts in Greek whose script—a Biblical majuscule—could also date back to the 6th century. In contrast to the first three works, already discussed, these two works were both previously unknown.

The first of these two texts is found underneath six folios of Sin. ar. NF 8 (ff. 48, 49, 51, 52, 54, 55), corresponding to three folios of the original manuscript rotated through 90° or 270° and folded in two. It is a treatise on medical terms[17] and resembles the *Collection of Hippocratic Terms* by Erotianus, but it is not the same text.[18] A number of entries are preserved, beginning with the letters *alpha* and *kappa,* such as ἀνήκεστος (‘incurable’, f. 48r) and κραμβίον (‘decoction of cabbage’, f. 49v).

The second hitherto-unknown text contains recipes for different diseases.[19] This is preserved in nine folios of Sin. ar. NF 8 (ff. 7, stub 9, 42–45, 59, 60, 99). They originate from five folios of the original manuscript which were rotated through 90° or 270° and then folded in two. Nigel Wilson has suggested that this text could be a section from a lost work of the 2nd century physician Antyllus.[20] In the extant pieces, we can read recipes for treating boils, along with instructions on how to remove a polyp from the nose and how to remove a tumour.

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[14] Littré, *Œuvres complètes d’Hippocrate*, I, 511–539.

[15] On the papyri containing Hippocratic texts see: https://www.trismegistos.org/author/390 (accessed 01.07.2023).

[16] Trismegistos 60175 / LDAB 1291: www.trismegistos.org/text/60175 (accessed 01.07.2023).

[17] This text was identified during the Sinai Palimpsests Project by Agamemnon Tselikas and Nigel Wilson, and further investigated from a codicological perspective by Giulia Rossetto.

[18] Nachmanson, *Erotiani vocum Hippocraticarum Collectio.*

[19] This text was identified during the Sinai Palimpsests Project by Agamemnon Tselikas and Nigel Wilson, and further investigated from a codicological perspective by Giulia Rossetto.

[20] Weißenberger and Nutton, Antyllus.

It is possible, but not certain, that the three Hippocratic texts and the two new medical texts come from one and the same original codex. In fact, the dimensions of the original folios and the *mise en page* are consistent for all five recovered works. According to my reconstruction, the original codex measured 260 × 200 mm and each folio had two columns of text with 42/43 lines of writing each. However, the hand which copied in Biblical majuscule the folios from the *Regimen*, *Treatise on medical terms*, and *Recipes* was different from the hand that copied the folios from the *Epidemics* and *Letters*. This means either that the works originate from two codices of similar size, or that (at least) two different scribes worked together to assemble the same manuscript. A further hint suggesting that at least some of the preserved texts originally belonged together can be found in remnants from a later foliation (?) in Greek minuscule letters on f. 7r (containing the text of the *Recipes*) and on f. 54v (containing the *Treatise on medical terms*). The numbers were located at the centre of the lower margin of the original folio. F. 7r carries the number ρλ΄ (130), while f. 54v carries the number ρλθ΄ (139). This numbering must have been applied before Sin. ar. NF 8 was created, i.e. before the second half of the 9th century (Fig. 5).

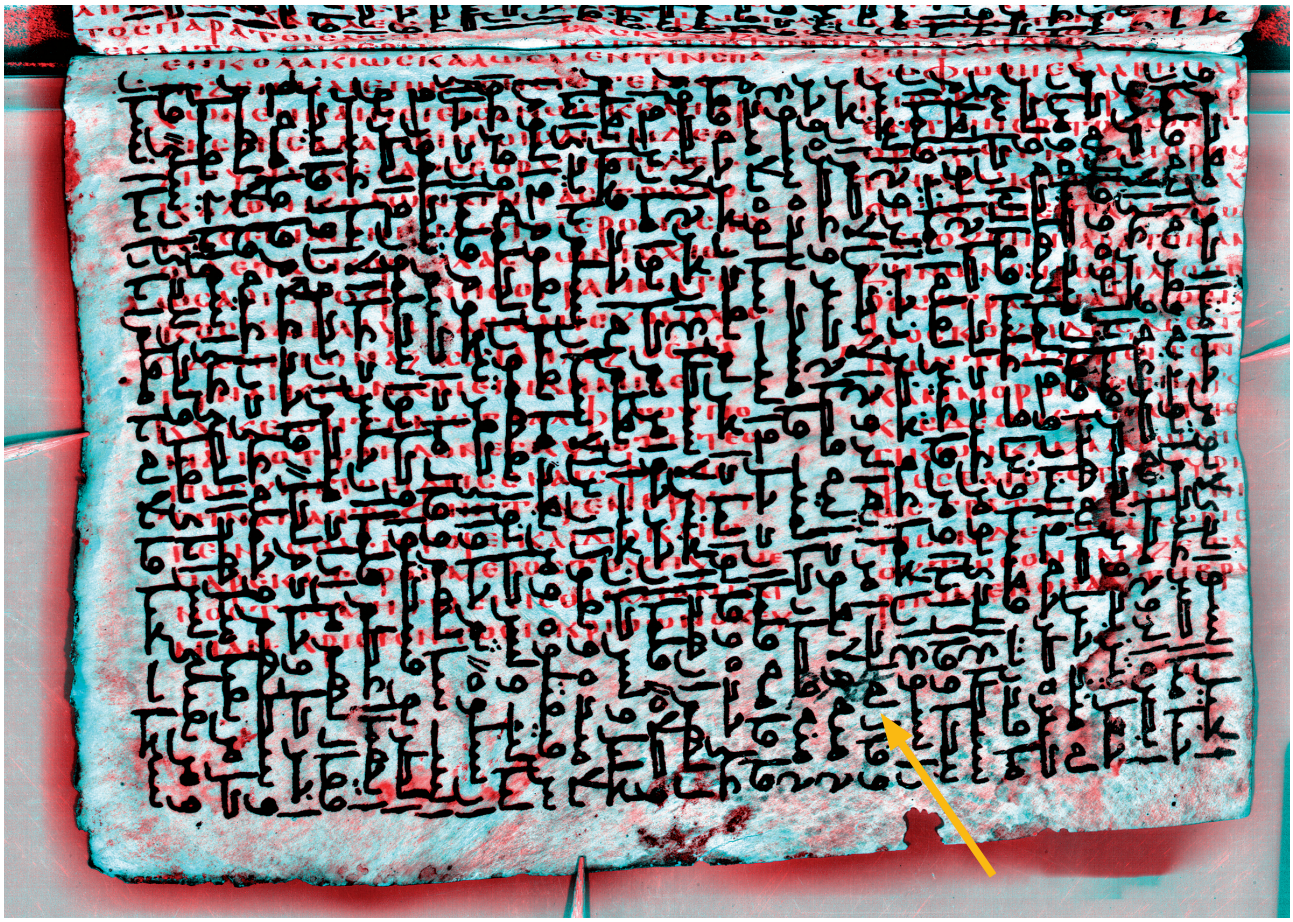

Fig. 5: Sin. ar. NF 8, f. 54v, foliation by later hand in Greek minuscule (ρλθ΄) in the centre of the lower margin of the original folio. Content of the undertext: *Treatise on medical terms.* Processed image by Keith Knox: KTK_pseudo_WBUVO22-MB780IR (© St. Catherine's Monastery, Sinai, Egypt)

Sin. ar. NF 8 preserves one further previously-unknown text, namely one folio from a codex (now ff. 16 and 17 of Sin. ar. NF 8) that contained a botanical collection with images of plants.[21] It preserves the drawings of the plants Adianton and Phileterion, both accompanied by short captions written in a loose majuscule of small size from the 5th–6th centuries. When thinking of a botanical collection with illustrations, we are immediately reminded of the famous *Vienna Dioscorides* (Vind. med. gr. 1 [*Diktyon* 71026]), which also dates to the

[21] This text was identified during the Sinai Palimpsests Project by Damianos Kasotakis and studied by Agamemnon Tselikas and Nigel Wilson. The text is partially transcribed in this volume by Damianos Kasotakis.

6th century. However, a comparison between the two texts shows that the wording in the Sinai folio does not correspond to Dioscorides. According to Nigel Wilson, it is tempting to think that the text preserved on this folio was composed by the physician Crateuas, since Crateuas is known to have been the author of the only illustrated herbal prior to Dioscorides.[22]

The final Greek classical text among the Sinai palimpsests so far studied by the Sinai Palimpsests Project is preserved in two folios and two fragments of Sin. ar. NF 66, namely f. 2 + frg. 7 + frg. 8 and f. 6 (Fig. 6). It contains a previously-unknown mythological poem with Orphic content in hexameters, written in a peculiar 5th–6th century bimodular Alexandrian majuscule and quite probably copied in Egypt (perhaps in Alexandria).[23] This text originates from a large luxury codex (300 × 250 mm) with 30 lines per page arranged in one column. The extant passages mention a number of Greek deities and mythological figures, such as Dionysus, Zeus, and Persephone, and seem to relate the Orphic version of the myth of Dionysus, born from the union of Persephone and Zeus. Metrical and stylistic features show that this is not a Late Antique work inspired by Nonnus of Panopolis, but rather something more archaic. My hypothesis is that this may well be a fragment of the otherwise lost *Hieroi Logoi* in 24 Rhapsodies. Until now fragments of this work had been only known thanks to the indirect tradition, especially in the form of quotations by the Neoplatonists (Proclus, Damascius, Porphyry).[24]

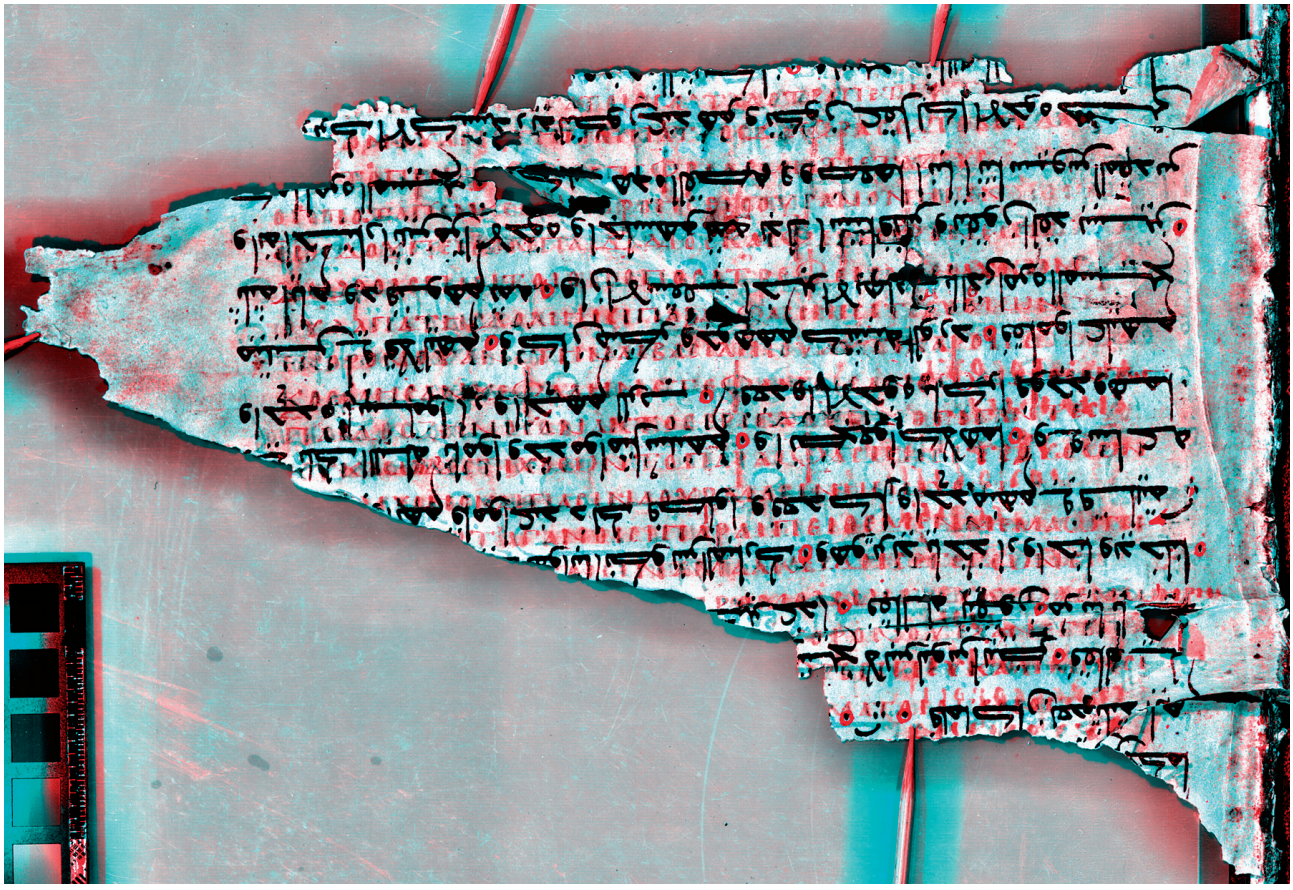

Fig. 6: Sin. ar. NF 66, f. 6v, mythological text in hexameters. Processed image by Keith Knox: KTK_pseudo_WBUVG58-MB780IR (© St. Catherine's Monastery, Sinai, Egypt)

[22] Touwaide, Crateuas.

[23] This text was identified during the Sinai Palimpsests Project by Giulia Rossetto. The *editio princeps* has been published in Rossetto, Fragments from the Orphic Rhapsodies? An updated edition can be found in Rossetto *et al.*, A Revised Text. On this same text see also Rossetto, "Library" and "Scriptorium", and Rossetto, *Greek Palimpsests at Saint Catherine's Monastery*, 47, 74, 266.

[24] West, *Orphic Poems*, 227ff., 256; Meisner, *Orphic Tradition*, 177.

Classical Texts in Latin

Only one classical text in Latin has been identified among the Sinai palimpsests.[25] Since a total of six Latin textual units have been recovered within the Sinai palimpsests, this means that classical texts represent 16.7% of the total number of Latin textual units. This text is found among the erased textual units of the patchwork manuscript Sin. ar. NF 8.

This is a fragment of the 5th-6th century Latin translation from the anonymous Greek novella *History of Apollonius of Tyre (Historia Apollonii regis Tyri)*. It originates from a luxury codex and is extant on one segment of f. 18. Indeed, f. 18 is made up of three pieces sewn together, and the Latin classical text is found on the lower outer piece, which measures 95 × 85 mm. On f. 18r it is possible to recognize an illustration, while on f. 18v a text passage of ten incomplete lines is visible.

The fragmentary image on f. 18r (Fig. 8) depicts two individuals, probably a young woman and a man, set beneath an architectural entabulature with Corinthian capitals. The subject could be Apollonius and his daughter, Tharsia, at the house of the innkeeper Stranguillio. This is suggested not only by the text which is found on f. 18v (i.e. the middle section of chapter 28), but also by comparison with later illuminated manuscripts containing the *History of Apollonius of Tyre*, which have a similar scene of a man and woman standing in an architectural setting.[26]

On f. 18r, the text passage in *scriptio continua* is written in an uncial script 4 mm high; the space between the lines is 10 mm (Fig. 7). According to David Ganz, this Latin uncial should be dated prior to the year 650: it is of very fine quality, and could hail from Rome. The text passage corresponds to the *History of Apollonius of Tyre*, 28.6–12 (ed. Kortekaas).[27] In the table below I transcribe the text as it is legible in Sin. ar. NF 8, and compare it with the text published in Kortekaas' edition of the text (*recensio* A and *recensio* B).[28] The words that appear in both the palimpsest folio and in the two edited *recensiones* (RA and RB) appear in bold.

Sin. ar. NF 8, f. 18v	**RA, 28.5–12 (ed. Kortekaas)**	**RB, 28.5–12 (ed. Kortekaas)**
1]amissa coniugem reg[2]tum accipere nolo[[29] 3]bertar cuius in mare p[4]potius operam merca[5]vobis filiam meam ut[6]utriatur quam ut bono[7]mo suscipiatis peto pat[8]ognominauitis nome[9]rea nutricem uxoris[10].em cura sua custodit[	Itaque, sanctissimi hospites, quoniam |[6] ex **amissa coniuge reg**num, quod mihi servabatur, **nolo accipere**, sed |[7] neque reverti ad socerum, **cuius in mar**i **p**erdidi filiam, sed **potius** |[8] **opera mer-ca**t<ur>us, commendo **vobis filiam meam**: cum filia vestra |[9] n**utriatur** et eam cum **bono** et simplici ani**mo suscipiatis** atque **pat**riae |[10] nomine eam c**o-gnomin**etis Tharsiam. Praete**rea** et **nutricem uxoris** |[11] meae, nomine Lycoridem, vobis commendo pariter et volo, ut filiam |[12] meam nutriat atque **custodi**at.	Apollonius intuens Stranguillionem |[6] et Dyonisiadem ait: Sanctissimi hospites, quoniam post **amissam coniugem** |[7] caram mihi servatum regnum **accipere nolo**, neque ad socerum |[8] reverti, **cuius in mare p**erdidi filiam, sed **potius opera merca**turus, |[9] commendo **vobis filiam meam, ut** cum filia vestra Philotimiade n**utriatur**. |[10] **Quam bono** et simplici ani**mo suscipiatis et pat**riae vestrae nomine |[11] c**ognominetis** Tharsia. Praete**rea nutricem uxoris** meae Lycoridem, |[12] quae **cura sua custodi**at puellam, vobis relinquo.

[25] This text was identified during the Sinai Palimpsests Project by David Ganz and further studied by Daniela Mairhofer, Michelle Brown, and András Németh. Besides Michelle Brown's contribution in the present volume, she has discussed this text in the following articles: Brown, The Bridge in the Desert; Brown, Were Early Medieval Picture Cycles Recycled from Late Antiquity? In April 2021, a workshop titled 'The Early Illustrated Apollonius of Tyre' on this specific fragment was organized by Michelle Brown and Jessica Lockhart: https://booksilkroadsapollonius.artsci.utoronto.ca/ (accessed 01.07.2023). The proceedings of the conference are forthcoming.

[26] A comparison can be established with the so-called *Apollonius Pictus* manuscript, Budapest, National Széchényi Library, Lat. 4, f. 3v. See: Brown, Were Early Medieval Picture Cycles Recycled from Late Antiquity?, 5 (Fig. 1.1), 10. On the illuminated manuscripts of the *History of Apollonius of Tyre* see also: Archibald, *Apollonius of Tyre*; Boreczky, Illustrated Life of Apollonius and Tarsia; Boreczky, *Apollonius pictus* Reevaluated; Boreczky and Németh (eds.), *Apollonius Pictus*.

[27] Kortekaas, *Story of Apollonius, King of Tyre*, 169 (28.6–12).

[28] The transcription is my own. I thank David Ganz, Daniela Mairhofer, and Clemens Weidmann for their feedback.

[29] Between *accipere* and *nolo*, there is a spatium of ca. three uncial letters. There are no traces of erasure nor is there a flaw in the parchment. *Accipere* appears to be followed by an insertion mark in the ink of the text. Below the spatium, there is a smudge.

As already mentioned, text editions are not the goal of this contribution. However, it can be noted that, although the text in Sin. ar. NF 8 differs in some extent from RA and RB, it would seem to be a little closer to the *recensio* B of the *History* defined by Kortekaas as 'the shorter, more logical and down to earth one'.[30] But generally, the presence of textual variants is to be expected, since the Sinai fragments predate by at least two centuries our oldest witnesses of the *History of Apollonius of Tyre*. In fact, before this discovery in the Sinai, the oldest direct attestations of the novella were known to be in manuscripts dating to the mid-9th century.[31] Moreover, the presence of the drawing makes this piece one of the earliest attestations of non-Christian subject in a Latin manuscript.

This small piece of parchment is double palimpsest (*bis rescriptus*), giving further insights into its history of reuse. The illustration and the text passage from the novella were overwritten for the first time during the 7th–8th century, after rotating them through 180°, in a Latin half-uncial, with the Athanasian creed.[32] According to Michelle Brown, this hand could be of western or Sinaitic origin.[33]

Later, the Latin novella and the 7th–8th-century Latin text above it were erased, the pieces stitched together with pieces of different provenance, and a new overtext (Gospels in Arabic) was applied by a Christian Arabic scribe, resulting in the patchwork manuscript in the current form: Sin. ar. NF 8.

Fig. 7: Sin. ar. NF 8, f. 18v: *History of Apollonius of Tyre*, 28.6–12 (ed. Kortekaas) on the lower outer piece of three pieces sewn together. Processed image by Keith Knox: KTK_pseudo_WBUVUVb-MB780IR (© St. Catherine's Monastery, Sinai, Egypt)

[30] Kortekaas, *Story of Apollonius, King of Tyre*, 3.
[31] Kortekaas, *Story of Apollonius, King of Tyre*, 100–101; Boreczky and Németh, *Apollonius Pictus*.
[32] This text has been identified by András Németh in April 2021, during the workshop 'The Early Illustrated Apollonius of Tyre'.
[33] Brown, Were Early Medieval Picture Cycles Recycled from Late Antiquity?, 10.

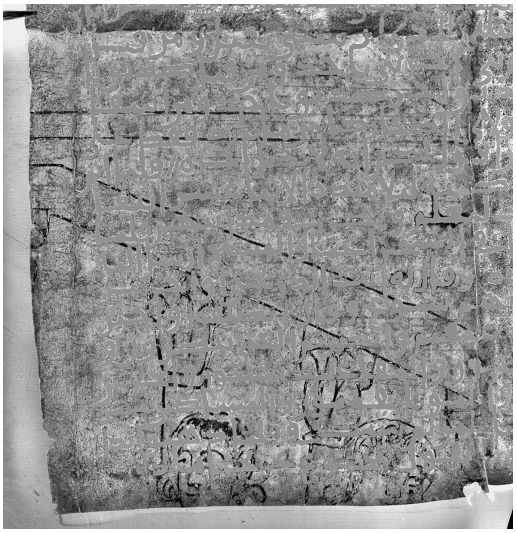

Fig. 8: Sin. ar. NF 8, f. 18r (detail): *History of Apollonius of Tyre*, illustration from chapter 28. Apollonius and his daughter Tharsia at the house of Stranguillio. Processed image by Keith Knox: KTK_sharpie_avgUV-MB780IR
(© St. Catherine's Monastery, Sinai, Egypt)

Classical Texts in Syriac

The classical texts in Syriac are translations or adaptations of Greek works, or original works that draw on Greek cultural history. They are three in total, out of the 91 textual units in Syriac which were identified during the Sinai Palimpsests Project. This means that the classical texts comprise 3.3% of the total of erased Syriac material.

The first text, which was copied in the 8th century, is a philosophical treatise on the four elements, which mentions various names of Greek philosophers, especially Aristotle and the Pre-Socratics.[34] This text, written in medial Estrangela, is extant as the *scriptio inferior* of the two folios which form Sin. ar. NF 68 (ff. 1, 2).[35] The *scriptio inferior*, in one column of 27–28 lines, runs parallel to the *scriptio superior*.

Next, we find a herbal that is closely related to the Greek pharmacological tradition. It shows some similarities with Dioscorides' *De materia medica* and recipes preserved in the *Syriac Book of Medicines*.[36] Plant names are indicated in both Greek and Syriac. This is one of several undertexts of manuscript Sin. ar. 514 (*Diktyon* 58317).[37] This textual unit is found on six folios (ff. 1a–1b, 3–4, 7–8) and is written in an 8th–9th-century medial Estrangela. Each folio contained 22–26 lines of text, arranged in one column. The herbal runs parallel to the *scriptio superior* and represents the middle text layer of a double palimpsest. In fact, it was copied on top of three further Syriac erased texts of Biblical nature (fragments from Ephesians, Thessalonians and Timothy, all copied during the 6th century), which form the lower erased layer.[38]

Finally, one folio—copied in the first half of the 9th century in Serto—contains the translation of Galen's main pharmacological treatise, *On simple drugs*.[39] This constitutes Sin. syr. NF frg. 65 (Fig. 9).[40] The *scriptio inferior* of this folio runs perpendicular to the *scriptio superior*. The text is arranged in two columns, of ca. 33 (reconstructed) lines.[41] The codex to which Sin. syr. NF frg. 65 originally belonged is now held by a private collector in the United States and an additional number of folios from that manuscript are scattered among

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[34] This text was identified during the Sinai Palimpsests Project by Paul Géhin.

[35] Meimaris, *Κατάλογος*, 35.

[36] This text was identified during the Sinai Palimpsests Project by Grigory Kessel, see his contribution in this volume.

[37] Gibson, *Catalogue of the Arabic MSS*, 102; Atiya, *Arabic Manuscripts*, 19; Atiya, Arabic Palimpsests of Mount Sinai, 115–119; Atiya, Codex Arabicus.

[38] These are texts numbers 11, 13, 14 in Kessel's contribution in this volume.

[39] This text was identified during the Sinai Palimpsests Project by Grigory Kessel. In particular, the Sinai folio contains the following passages: f. 1r, XI 685–488 (ed. Kühn); f. 1v, XI 683–685 (ed. Kühn). See also Afif *et al.*, Syriac Galen Palimpsest, 138.

[40] Brock, *Catalogue of Syriac fragments*, 63–64.

[41] Afif *et al.*, Syriac Galen Palimpsest, 149.

different locations, such the Vatican Library, the National Library of France, and Harvard University Library (BnF syr. 382, f. 10; Houghton Library, syr. 172; Vat. sir. 623, f. 227 [*Diktyon* 69457]; Vat. sir. 647, ff. 38–39). Together, they form the so-called *Syriac Galen Palimpsest*.[42] This medical manuscript was probably produced in northern Mesopotamia or western Syria.[43]

Fig. 9: Sin. syr. NF frg. 65, f. 1r containing Galen, *On simple drugs* XI 685–688 (ed. Kühn). Processed image by Roger L. Easton, Jr. and David Kelbe: bands01-23_RF+FL_cal_bands_01+02+17-23_undertext_only_ICA_R_ratio2-1_G7_B7 (© St. Catherine's Monastery, Sinai, Egypt)

PATTERNS OF PARCHMENT REUSE

The parchment folios containing classical texts which are preserved in St. Catherine's collection of palimpsests were reused in two main ways. In the first case scenario, the original bifolios were kept and reused as such, rotated through 0° or 180°. This is the case for the classical works in Sin. ar. 514 (Syriac undertext), Sin. ar. NF 66 (Greek undertext), and Sin. ar. NF 68 (Syriac undertext). In the second method of recycling, the original bifolios were cut in two and each folio was then rotated through 90° or 270°, folded in two, and reused as new bifolio. This is the case for Sin. syr. NF frg. 65 (Syriac undertext) and for all Greek undertexts of Sin. ar. NF 8.[44] Sin. syr. NF frg. 65 and Sin. ar. NF 8 are smaller in size than Sin. ar. 514, Sin. ar. NF 66 and Sin. ar. NF 68.[45] This seems to show that different methods of reuse are not specific to different language cultures. As it is

[42] Afif *et al.*, Continuing Research on the Syriac Galen Palimpsest; Afif *et al.*, Syriac Galen Palimpsest; Bhayro *et al.*, Collaborative research; Bhayro *et al.*, Syriac Galen palimpsest; Hawley, More identifications of the Syriac Galen palimpsest; Kessel, Membra disjecta sinaitica I; Kessel, Membra disjecta sinaitica II.

[43] Afif *et al.*, Syriac Galen Palimpsest, 112, 153.

[44] Sin. ar. NF 8 also contains among its undertexts the classical text in Latin. However, the fact that the original folio with the Latin text was cut into small pieces and sewn together with fragments from other manuscripts in order to make one folio of the new Arabic manuscript does not allow its inclusion in this kind of analysis.

[45] These are the dimensions (from the largest to the smallest): Sin. ar. NF 66 (290 × 240 mm), Sin. ar. 514 (223 × 150 mm), Sin. ar. NF

often the case, the resulting smaller or mid-sized codices were mostly used for liturgical manuscripts, such as *Euchologia*.[46]

The eleven classical texts are preserved as the *scriptiones inferiores* of five manuscript objects (shelfmarks) of the Sinai collection. The upper texts of four are written in Arabic (Sin. ar. 514, Sin. ar. NF 8, Sin. ar. NF 66, Sin. ar. NF 68), while one is in Syriac (Sin. syr. NF frg. 65). In addition, the folio of Sin. ar. NF 8 containing the Latin classical text is double palimpsest, the Latin work being the lowest layer. This means that the fragments from the novel were overwritten twice: the first time in Latin and the second time in Arabic.

All five shelfmarks contain Christian texts: two are liturgical (one *Euchologion* and one *Oktoechos* for the ordinary days),[47] two are hagiographical,[48] and one contains the Gospels.[49] The four Arabic manuscripts were copied between the 9th and the 10th century, while the Syriac manuscript dates to the 11th–12th century. The place where these manuscripts were copied is known in most of the cases: Sin. ar. 514 and Sin. ar. NF 8 were copied in the Sinai or in Palestine, Sin. ar. NF 66 at the Monastery of Mar Saba near Jerusalem, and Sin. syr. NF frg. 65, possibly, at the Black Mountain near Antioch.

For assembling these manuscripts the scribes most probably had at their disposal a pile of mixed sheets of parchment. This is clearly demonstrable for two manuscripts, namely Sin. ar. 514 and Sin. ar. NF 8. In fact, Sin. ar. 514 was written on top of erased parchment folios originating from a number of original manuscripts containing one or more textual units, in various languages. So far, a total of 29 textual units have been identified underneath Sin. ar. 514. These are scattered throughout the manuscript in random order.[50] Similarly, a total of 33 textual units in different languages have been identified underneath Sin. ar. NF 8. This second case is particularly significant, since Sin. ar. NF 8 is a real patchwork, whose individual folios are made up of several uneven pieces of parchment from different manuscripts sewn together: it is therefore likely that erased folios (probably already damaged) originating from several manuscripts were piled up in a random order, and pieces were cut out from these mixed folios and then sewn together.

It is important to note once again that several textual units could belong to one and the same original manuscript, and therefore it must be assumed that the original manuscripts which were reused in order to assemble Sin. ar. 514 and Sin. ar. NF 8 were considerably less than 29 and 33. For instance—as we have seen above—five of the seven Greek classical textual units from Sin. ar. NF 8 (Hippocrates, *Regimen*; Hippocrates, *Epidemics*; Hippocrates, *Letters*; *Treatise on medical terms*; Antyllus [?], *Recipes for different diseases*) probably belonged to the same original manuscript.

DATE AND ORIGIN OF THE ERASED PARCHMENT SHEETS

For none of the cases presented here it is possible to establish exactly when a classical text was erased. However, the combined study of the *scriptiones inferiores* and *superiores* allows some speculation about the chronological gap between them. This extends from a minimum of 50–100 years (Sin. ar. 514) to a maximum of 400 years (Sin. ar. NF 8), the average being 250 years. In the case of the shortest gap, this occurs in a manuscript where the *scriptio superior* is in Arabic and the *scriptio inferior* is in Syriac, while the longest gap (approximately 400 years) applies to all seven Greek classical texts written between the 5th and the 6th centuries with the *scriptio superior* in Arabic of the second half of the 9th century.

It is reasonable to think that in these time spans the original manuscripts might have changed owners and locations. In fact, the places where the *scriptiones superiores* were applied often differ from those in which the *scriptiones inferiores* originate. We do not know whether the sheets containing the classical works travelled in the form of complete codices or as erased folios ready to be overwritten. Nevertheless, in three instances we can (partially) reconstruct the manuscripts' journeys.

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68 (210 × 128 mm), Sin. ar. NF 8 (183 × 128 mm), Sin. syr. NF frg. 65 (175 × 120 mm).

46 More about this in Rapp *et al.*, Byzantine Prayer Books, 183–191 (a section by G. Rossetto, Codicological Pathways in Search of Euchologia Palimpsest Manuscripts).

47 Sin. ar. NF 68, Sin. syr. NF frg. 65.

48 Sin. ar. 514, Sin. ar. NF 66.

49 Sin. ar. NF 8.

50 See the contribution of Grigory Kessel in this volume.

The Latin fragment from the *History of Apollonius of Tyre* that lies underneath Sin. ar. NF 8 was probably written in Rome before 650. During the 7th–8th century it was overwritten in Latin with the Athanasian creed, and later—in the second half of the 9th century—it was rewritten in Arabic with Gospels, in Palestine or in the Sinai. This implies a long journey, from west to east. A further undertext of Sin. ar. NF 8, this time of documentary nature and identified by Alexander Treiger, is an Arabic sales deed that hails from Ramla, Palestine (south of modern Tel Aviv) and dates to the year 841, which sets the *terminus post quem* for the dating of the *scriptio superior*. This does not imply that the Latin text necessarily reached Ramla or that the overtext of Sin. ar. NF 8 was written in Ramla, but helps to illustrate the complexity in the movement of parchment before all these texts finally reached the Monastery of St. Catherine as part of the same codex.

In the other two cases, the parchments do not seem to have travelled as far as in the first example. The *scriptio inferior* of Sin. syr. NF frg. 65, namely the Syriac translation of Galen's *On simple drugs*, was copied in northern Mesopotamia or western Syria in the first half of 9th century, while the liturgical book (*Oktoechos*) that substituted it was copied, possibly, at the Black Mountain near Antioch in the 11th–12th century. As a note in Arabic indicates, this book was donated to the Monastery of St. Catherine in the 12th or in the 13th century.[51] In this case the parchment sheets travelled from northeast to southwest.

The final example is represented by Sin. ar. NF 66. The Greek mythological text that lies erased under the Arabic writing was copied in Egypt, probably in Alexandria, in the 5th–6th century, while the overtext was certainly copied at the Monastery of Mar Saba near Jerusalem some time between 903 and 925. Once more, the parchment folios travelled, this time from southwest to northeast, but remained—as in the previous case—in a nearby region.

WHY WERE CLASSICAL TEXTS DISCARDED?

As we have seen by analysing each classical texts in detail, in all cases except one (Sin. syr. NF frg. 65) the language of the *scriptio superior* differs from that of the classical erased texts. It can therefore be supposed that the language that is now in the undertext was not understood in the new environment where the parchments sheets landed.

It is also significant that we do not find any Greek work that overwrites a Greek classical text, even though this might be just chance. Moreover, all the Greek classical texts that have been identified within the Sinai palimpsests are written in majuscule, a script that was largely abandoned as a consequence of the *metacharakterismos* (around the 9th century), and replaced by minuscule. The Arabic codices that overwrite the Greek classical texts date to precisely this period (9th century). In this instance, it is not possible to prove that there is a connection between the two events, namely between the transliteration of Greek texts from majuscule into minuscule and the substitution of Greek classical texts in majuscule with Arabic works.

It seems reasonable to suppose that these texts were discarded, at least in the case of those in Greek, because of the different language, the kind of script that was hard to read (it should be recalled that the Greek texts in majuscule were written in *scriptio continua* and lacking diacritics) and because of the distance in time between overtext and undertext (a maximum of 400 years), during which the original codices might have suffered damage.

[51] Afif *et al.*, Syriac Galen Palimpsest, 114.

APPENDIX: CLASSICAL TEXTS AMONG THE SINAI PALIMPSESTS

Scriptio Superior	***Scriptiones Inferiores***			
Shelfmark, Content, Origin, Date	**Work**	**Language**	**Date and Origin**	**Identified by**
Sin. ar. 514 Hagiographica (Sinai?, early 10th c.)	Anonymous, *Herbal*	Syriac	8th–9th c.	Grigory Kessel
Sin. ar. NF 66 Saints' Lives (Mar Saba, 903–925)	Anonymous, *Mythological poem*	Greek	5th–6th c. (Alexandria?)	Giulia Rossetto
Sin. ar. NF 68 Euchologion (10th c.)	Anonymous, *Philosophical treatise on the four elements*	Syriac	8th c.	Paul Géhin
Sin. ar. NF 8 Gospels (Palestine or Sinai, 2nd half 9th c.)	Hippocrates, *Regimen I*	Greek	6th c.	Agamemnon Tselikas Nigel Wilson Giulia Rossetto
	Hippocrates, *Epidemics VII*	Greek	6th c.	Agamemnon Tselikas Nigel Wilson Giulia Rossetto
	Hippocrates, *Letters* 3 – 7, 9 – 10, 25	Greek	6th c.	Agamemnon Tselikas Nigel Wilson Giulia Rossetto
	Crateuas (?), *Botanical collection with images of plants*	Greek	5th–6th c.	Damianos Kasotakis Nigel Wilson Agamemnon Tselikas
	Anonymous, *Treatise on medical terms*	Greek	6th c.	Nigel Wilson Agamemnon Tselikas Giulia Rossetto
	Antyllus (?), *Recipes for different diseases*	Greek	6th c.	Nigel Wilson Agamemnon Tselikas
	Anonymous, *History of Apollonius of Tyre*	Latin	Before 650 (Rome?)	David Ganz Michelle Brown Daniela Mairhofer
Sin. syr. NF frg. 65 Parakletike (Black Mountain near Antioch?, 11th–12th c.)	Galen, *On simple drugs*	Syriac	1st half 9th c. (Syro-Mesopotamian region)	Grigory Kessel

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Pasquale Orsini

Scritture, libri e testi greci: nuovi materiali dal Sinai[1]

Abstract: The study of the Sinai Greek palimpsests produced interesting results. As for palaeography (particularly with regard to 'canonized' majuscules and 'scrittura mista') important witnesses emerged for the period 6th–9th c., providing new evidence for the relative chronology of scripts. Concerning book formats, it was possible to reconstruct some codicological units and, in particular, to study the reuse of some liturgical scrolls, and to propose the reconstruction of their original structure. The identification of texts also brought new results. In several cases Sinaitic palimpsests appear to be the oldest witnesses for some authors, in other cases they document important textual variants, and in a couple of cases they seem to transmit texts that were unknown or unpublished until now.

Nel presente contributo si riportano i principali risultati delle indagini da me condotte sui manoscritti sinaitici che mi sono stati assegnati nell'ambito del Sinai Palimpsests Project. I codici "contenitori" analizzati sono 12, nei quali è stato possibile individuare 31 unità palinseste in lingua greca e 1 in lingua copta (Tab. 1).

	Mss. / UTO	**Consistenza**	**Fogli**	**Contenuto**
1	**Sin. geo. 49**	***119***		**Menaion**
	UTO 1	6	25–26, 28–30, 42	Vangelo di Marco; Vangelo di Giovanni
	UTO 2	1	63	Testo liturgico non identificato II
	UTO 3	42	57–62, 64–73, 78–95, 112–119	Poema cristiano non identificato [+ Sin. geo. NF frg. 73a, UTO 1]
	UTO 4	9	49–50, 53–55, 104, 107–108, 111	Testo liturgico non identificato I
	UTO 5	21	50–52, 56, 63, 74–77, 96–103, 105–106, 109–110	Liturgia di San Giacomo
	UTO 6	1	44	Testo non identificato (copto)
	UTO 7	1	42	Menaion
2	**Sin. geo. NF frg. 72a**	***2***		**Collezione liturgica**
	UTO 1	2	1–2	Testo non identificato
3	**Sin. geo. NF frg. 73a**	***4***		**Menaion di Michele Modrekili (4 dicembre)**
	UTO 1	4	1–4	Poema cristiano non identificato [+ Sin. geo. 49, UTO 3]
4	**Sin. gr. 2053 (*Diktyon* 60428)**	***34***		***Excerpta* dalle Sacre Scritture**
	UTO 1	8	17–24	Synaxarion
	UTO 2	4	25–28	Inni liturgici
	UTO 3	16	1–16	Antologia di Salmi

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[1] Si avverte che il presente contributo conserva la struttura della relazione orale letta nella seduta del 25 aprile 2018 a Vienna, con l'aggiunta della bibliografia essenziale. Per un quadro riassuntivo dei palinsesti sinaitici greci si veda Rossetto, *Three Euchologia*, 144–156. Inoltre, quando nel presente lavoro si riportano informazioni relative a palinsesti sinaitici studiati da altri ricercatori nell'ambito del Sinai Palimpsests Project, si fa riferimento alle schede formalmente pubblicate nel sito internet https://sinai.library.ucla.edu/ (ultimo accesso: 01.07.2023) con l'espressione "fonte SPP" inserita tra parentesi.

	Mss. / UTO	Consistenza	Fogli	Contenuto
5	**Sin. gr. 446 (*Diktyon* 58821)**	***204***		**Discorsi sull'ascetismo**
	UTO 1	20	1–20	Giovanni Crisostomo, *Homiliae 1–67 in Genesim* (*CPG* 4409)
	UTO 2	50	21–58, 60–67, 136–139	Testo liturgico (benedizione delle acque per l'Epifania ?)
	UTO 3	134	68–135, 140–204	Collezione di inni liturgici
6	**Sin. gr. 699 (*Diktyon* 59074)**	***143***		**Akolouthiai**
	UTO 1	16	57–72 + talloni 59, 63, 67, 69	Triodion
	UTO 2	2	50, 56	Giovanni Crisostomo, *In quatriduanum Lazarum* (= *Contra Anomoeos, homilia 9*) [Spurio]
	UTO 3	2	52, 54	Giovanni Crisostomo, *De occursu domini, de deipara et Symeone* [Spurio]
	UTO 4	3	51, 53, 55 + tallone 53	Giovanni Crisostono (?), Testo non identificato
	UTO 5	8	73–80 + talloni 76. 77, 80, 81	Heirmologion
	UTO 6	1	81	Pentekostarion
7	**Sin. gr. NF M 130 (*Diktyon* 60957)**	***1***		**Troparia**
	UTO 1	1	1	Giovanni Climaco, *Scala Paradisi* (*CPG* 7852)
8	**Sin. gr. NF M 48 (*Diktyon* 60875)**	***30***		**Preghiere per i vespri e mattutini**
	UTO 1	6	22–27	Typicon
9	**Sin. gr. NF MG 2 (*Diktyon* 61040)**	***115***		**S. Paolo, *Epistulae***
	UTO 1	36	32–37, 42–43, 47, 50–53, 56–59, 62–67, 71, 74, 96–97, 102, 104–106, 110–114	Vecchio Testamento (*Siracides, Ieremias, Baruch, Threni, Epistula Ieremiae, Ezechiel, Daniel*)
	UTO 2	70	1–31, 38–41, 44–46, 48–49, 54–55, 60–61, 68–70, 72–73, 75–86, 88–89, 91–93, 100–101, 108–109	Socrate di Costantinopoli, *Historia ecclesiastica* (*CPG* 6028)
	UTO 3	8	87, 90, 94–95, 98–99, 103, 107	Antioco il Monaco, *Pandecta Scripturae Sacrae* (*CPG* 7843)
10	**Sin. gr. NF MG 29 (*Diktyon* 61067)**	***46***		**Oktoechos (Paracletica)**
	UTO 1	44 + frg. 37	3–46 + frg. 1–35, 41–42	Vangelo di Matteo
	UTO 2	2	1–2	Salmi
11	**Sin. syr. 30 (*Diktyon* 60742)**	***181***		**Collezione agiografica**
	UTO 1	4	142, 144, 147, 149	Vangelo di Giovanni
	UTO 2	6	171–172, 176–177, 181–182	Ps.-Macario/Simeone, *Epistula magna* (*CPG* 2415.2)
	UTO 3	6	173–175, 178–180	Efrem Siro, *Sermo asceticus* (*CPG* 3909)
12	**Sin. syr. NF M 42 (CPA)**	***8***		**Lezionario dei Vangeli**
	UTO 1	8	1–8	Giovanni Crisostomo, *In Genesim homiliae 1–67* (*CPG* 4409)

Tab. 1: Manoscritti studiati e unità palinseste (UTO = Undertext Object)[2]

[2] La numerazione delle UTO nel presente contributo non ha corrispondenza nel sito https://sinai.library.ucla.edu/ (ultimo accesso:

Occorre segnalare che nel manoscritto Sin. geo. 49 ci sono tre unità con fogli *bis rescripti*:

1. UTO 1, tranne il f. 42: sul testo greco, copiato in maiuscola biblica e attribuibile al sec. VI[3], è stato trascritto un testo non identificato in siriaco, attribuito al sec. X da Grigory Kessel (fonte SPP).
2. UTO 1, f. 42: il primo strato è stato copiato in maiuscola biblica del VI secolo, il secondo strato è stato copiato in "scrittura mista" del IX secolo e costituisce la UTO 7.
3. UTO 3: sul testo greco, copiato in maiuscola ogivale inclinata attribuibile al sec. VI med.–VII med., è stato trascritto un testo in arabo (non identificato, ma di contenuto cristiano) e attribuito al X secolo da Alexander Treiger (fonte SPP; vedi *infra*).

1. LE SCRITTURE

Il primo aspetto rilevante di queste 32 unità palinseste riguarda le tipologie grafiche utilizzate per copiare i testi.

1.1. Le maiuscole

Iniziamo con le scritture maiuscole. Quelle documentate sono – in ordine decrescente di attestazioni – la maiuscola ogivale inclinata, la maiuscola biblica e la maiuscola alessandrina (Tab. 2)[4].

Mss/UTO	Scrittura	Datazione
Sin. gr. NF MG 29, UTO 1	Maiuscola alessandrina, unimodulare	551–600
Sin. geo. 49, UTO 1	Maiuscola biblica	501–600
Sin. syr. 30, UTO 1	Maiuscola biblica	501–600
Sin. geo. 49, UTO 3 + Sin. geo. NF frg. 73a, UTO 1	Maiuscola ogivale inclinata	551–650
Sin. syr. 30, UTO 2	Maiuscola ogivale inclinata	601–700
Sin. syr. 30, UTO 3	Maiuscola ogivale inclinata	601–700
Sin. gr. 699, UTO 1	Maiuscola ogivale inclinata	701–800
Sin. gr. NF MG 2, UTO 1	Maiuscola ogivale inclinata	701–800
Sin. gr. NF MG 29, UTO 2	Maiuscola ogivale inclinata	751–800
Sin. geo. 49, UTO 2	Maiuscola ogivale inclinata	801–900

01.07.2023) ed è stata, pertanto, qui introdotta per agevolare la lettura.

[3] È utile segnalare che la UTO 1 del manoscritto Sin. geo. 49 e la *scriptio inferior* del manoscritto Sin. gr. NF MG 99 – sebbene entrambi conservino frammenti del Nuovo Testamento, siano stati copiati nella stessa tipologia grafica (maiuscola biblica) e con un *layout* simile (2 colonne di scrittura di circa 27–28 righe ciascuna) – sono stati copiati da mani differenti e in periodi differenti (sec. VI il primo e ca. la metà del V secolo il secondo [fonte SPP]).

[4] La storia delle scritture maiuscole greche è fondata – in assenza di una datazione esplicita o di dati cronologici oggettivi – sul confronto con altri manoscritti datati e databili, che presentano le stesse tipologie grafiche. È utile segnalare che le sottoscrizioni sono sconosciute nei manoscritti greci prima del IX secolo d.C. e non ci sono testi esplicitamente datati tra il II e il VI secolo d.C.: per esempio, il *Dioscuride di Vienna* (LDAB 10000), copiato in maiuscola biblica, è databile prima del 513 d.C. e alcune lettere festali dei patriarchi alessandrini (vedi *infra*; sulla datazione vedi la bibliografia citata alla nota 5) possono essere utili per datare manoscritti in maiuscola alessandrina. Sulla base del principio del confronto formale, il metodo paleografico consiste nella ricostruzione di un modello storico per ciascuna tipologia grafica, il quale permette di inserire un manoscritto non datato all'interno di una possibile sequenza cronologica. Non bisogna, tuttavia, nascondere il fatto che uno degli elementi che rende il metodo paleografico inaffidabile e poco credibile per i non addetti ai lavori è spesso l'uso eccessivo del "talento naturale" dello studioso, il cosiddetto "occhio paleografico", ovvero la capacità soggettiva di riconoscere e identificare scritture e mani. Indubbiamente, l'esperienza gioca un ruolo importante nella paleografia, come nella maggior parte delle scienze umane. Tuttavia, è il metodo – un processo secondo un ordine predeterminato di azioni, procedure, convenzioni, che garantisce la riproducibilità e verificabilità delle osservazioni alla base dell'intero processo di ricerca – che dà risultati attendibili, credibili e oggettivi, anche quando questi non sono quelli attesi.

Sin. gr. 2053, UTO 2	Maiuscola ogivale inclinata	801–900
Sin. gr. 699, UTO 2	Maiuscola ogivale inclinata	801–900
Sin. gr. 699, UTO 3	Maiuscola ogivale inclinata	801–900
Sin. gr. 699, UTO 4	Maiuscola ogivale inclinata	801–900
Sin. gr. NF MG 2, UTO 2	Maiuscola ogivale inclinata	850–900
Sin. gr. NF MG 2, UTO 3	Maiuscola ogivale inclinata	850–900
Sin. gr. 446, UTO 1	Maiuscola ogivale inclinata	850–950
Sin. gr. 446, UTO 2	Maiuscola ogivale inclinata	850–950
Sin. gr. 2053, UTO 3	Maiuscola ogivale inclinata*	801–900

Tab. 2: Scritture maiuscole
* Con inserimento sporadico e non sistematico di elementi della "scrittura mista" (*alpha* e *my*).

Un caso interessante è rappresentato dalla maiuscola alessandrina. Questa tipologia grafica – come è noto – trae le sue origini in un gruppo di scritture attestate tra II e III secolo, con forti legami con le scritture burocratiche-amministrative. Essa stabilizza le sue forme – tra IV e V secolo – in un "canone" o "struttura normativa" e si manifesta in due varianti:[5]

1. unimodulare (con tutte le lettere di modulo omogeneo, inscrivibili in un quadrato), prevalentemente diffusa fino al V–VI secolo;
2. bimodulare (con alternanza di modulo: *epsilon, theta, omicron, sigma* di modulo rettangolare, mentre le altre lettere sono di modulo quadrato), più diffusa a partire dal V secolo; per questa variante ci sono alcuni manoscritti datati (contenenti diverse *Lettere festali*), utili per la cronologia: PSI XVI 1576 (a. 421; LDAB 131510); P. Grenf. II 112 (aa. 482, 577 o 672, con una preferenza per l'anno 577; LDAB 6291); P. Köln V 215 (aa. 579, 584, 663 o 674, con una preferenza per gli anni 663 o 674; LDAB 458), P. Horak 3 (aa. 711 o 722; LDAB 10250), BKT VI 55–109 (aa. 713 o 719; LDAB 194).

La variante unimodulare è attestata nel Sin. gr. NF MG 29, UTO 1, ed è attribuibile alla seconda metà del VI secolo: considerato il periodo cronologico a cui è riferibile, questo palinsesto sinaitico rappresenta un testimone importante per la storia di questa tipologia grafica.

Inoltre, è utile segnalare che la tipologia bimodulare risulta attestata in altri palinsesti sinaitici studiati da altri ricercatori nell'ambito del Sinai Palimpsests Project: Sin. geo. NF 19, f. 53 (Vecchio Testamento, 2 Re), attribuito da Agamemnon Tselikas all'VIII secolo (fonte SPP); Sin. ar. NF 66, ff. 2, 4, 6–8 (poema mitologico non identificato, in esametri), attribuito da Giulia Rossetto al V–VI secolo e con una maiuscola alessandrina influenzata sia dalla maiuscola biblica sia dalla maiuscola ogivale diritta (fonte SPP).

Tuttavia, la maiuscola più attestata risulta essere la maiuscola ogivale inclinata.[6] I suoi testimoni sinaitici si possono suddividere in due gruppi:

1. quelli che presentano le caratteristiche grafiche considerate tipiche dell'area sinaitico-palestinese (Sin. gr. NF MG 29, UTO 2; Sin. gr. NF MG 2, UTO 3; Sin. geo. 49, UTO 2; Sin. gr. 699, UTO1, UTO 2, UTO 3, UTO 4;[7] Sin. gr. 446, UTO 1, UTO 2; Sin. gr. 2053, UTO 2, UTO 3);
2. quelli che, invece, non presentano tali caratteristiche (Sin. gr. NF MG 2, UTO 1, UTO 2; Sin. syr. 30, UTO 2, UTO 3; Sin. geo. 49, UTO 3).

[5] Sulla maiuscola alessandrina vedi Irigoin, L'onciale grecque de type copte; Cavallo, Funzione e strutture, 109–110; Cavallo, *Il calamo e il papiro*, 175–202; Cavallo, *Scrittura greca e latina*, 101–105; Radiciotti, Nuova proposta di datazione; Cavallo, Greek and Latin Writing, 129–131; Bastianini e Cavallo, Nuovo frammento; Crisci e Degni, *Scrittura greca*, 120–123.

[6] Sulla maiuscola ogivale inclinata vedi Orsini, Maiuscola ogivale inclinata, e Id., Sloping Pointed Majuscule, con riferimento critico alla bibliografia precedente.

[7] Le UTO 2, 3 e 4 del manoscritto Sin. gr. 699 sono state copiate dalla stessa mano e probabilmente appartenevano in origine allo stesso manoscritto.

Le caratteristiche ricondotte da vari paleografi alle manifestazioni della maiuscola ogivale inclinata di area sinaitico-palestinese sono le seguenti: angolo di inclinazione molto pronunciato, accentuato contrasto fra tratti spessi e tratti sottili, tratti verticali leggermente incurvati verso sinistra all'estremità inferiore, *delta* con ingrossamento ornamentale del tratto di base prevalentemente a sinistra, *rho* con tratto verticale sinuoso, *ypsilon* con calice piuttosto largo, *phi* con anello morbido e schiacciato.[8] Sebbene non tutti questi elementi risultano di per sé ugualmente distintivi, tuttavia il loro comporsi in un tessuto grafico unitario conferisce ai manoscritti in cui ricorrono un aspetto peculiare e riconoscibile.

Infine, per la storia di alcune maiuscole greche questi palinsesti sinaitici rappresentano testimoni importanti. Infatti, è nota in questo specifico ambito di studi la scarsità di manoscritti datati, utili sia per ricostruire la storia delle singole tipologie grafiche sia per proporre confronti ai fini della datazione di manoscritti non datati[9]. In alcuni palinsesti, pertanto, la relazione cronologica tra la *scriptio superior* (datata o con ancoraggi cronologici certi) e *scriptio inferior* (non datata) può essere un elemento regolativo per la cronologia di quest'ultima. Prendiamo in esame, tra i palinsesti sinaitici in maiuscola, i casi più significativi.

1. Sin. syr. 30. La *scriptio superior* in siriaco è datata all'anno 779. Il testo siriaco è stato copiato a Maʿarrat Meṣrin (in Siria) e anche se la data è incerta – in quanto l'ultima cifra dell'espressione dell'anno è andata persa per un piccolo foro materiale sulla pergamena – l'ipotesi più attendibile è quella dell'anno 779.[10] Le *scriptiones inferiores* – le quali pertanto hanno tutte come *terminus ante quem* l'anno 779 – sono le seguenti:[11]

– UTO 1: maiuscola biblica, databile al sec. VI e con possibile localizzazione in area siriaco-antiochena;
– UTO 2: maiuscola ogivale inclinata, attribuibile al sec. VII;
– UTO 3: maiuscola ogivale inclinata, attribuibile al sec. VII.

Le UTO 2 e 3 presentano la stessa tipologia grafica e sono state copiate dalla stessa mano.

2. Sin. gr. NF MG 2. La *scriptio superior* in arabo è databile posteriormente all'anno 867, in quanto l'archetipo del testo arabo è stato individuato da Vevian Zaki nel manoscritto Sin. ar. 151,[12] copiato nell'anno 867; infatti, alcuni fogli dell'archetipo sono stati rimpiazzati con altri nell'XI secolo; ma il testo dei fogli rimpiazzati è completamente differente nell'apografo: questo indicherebbe che nell'apografo questo testo è stato copiato dall'antigrafo quando questo aveva ancora i suoi fogli originari. Le *scriptiones inferiores* – tutte anteriori alla fine del IX o all'inizio del X secolo – sono le seguenti:

– UTO 1: maiuscola ogivale inclinata, attribuibile al sec. VIII;
– UTO 2: maiuscola ogivale inclinata, attribuibile alla seconda metà del sec. IX;
– UTO 3: maiuscola ogivale inclinata, attribuibile alla seconda metà del sec. IX.

3. Sin. gr. NF MG 29. La *scriptio superior* è in greco e copiata in "scrittura mista", tipologia grafica – come si dirà poco oltre – i cui testimoni risultano riferibili tutti al IX secolo. La *scriptio inferior* della UTO 2 è una maiuscola ogivale inclinata, attribuibile alla seconda metà dell' VIII secolo e probabilmente riconducibile all'area egizio-palestinese.

1.2. La "scrittura mista"

La "scrittura mista"[13] è una variante della maiuscola ogivale inclinata in area sinaitico-palestinese. Essa presenta le lettere *alpha* e *my* minuscole inserite nel tessuto grafico della maiuscola ogivale inclinata. Altre lettere caratteristiche sono: *beta*, allungato e sporgente nell'interlinea superiore e inferiore; *delta* col tratto obliquo di destra prolungato verso l'alto e ripiegato a uncino; *theta* stretto e allungato; *kappa* con il tratto obliquo ascendente disposto orizzontalmente e l'asta verticale a volte raddoppiata; *lambda* con il tratto di destra sinuoso, allungato, e a volte completato in alto da un vistoso ripiegamento a uncino; *ypsilon* in una variante "a calice" molto aperto, realizzato in un unico tratto ondulato, che si affianca alla più comune forma maiuscola. La scrittura appare a volte più compatta, con contrasto accentuato tra tratti sottili e tratti spessi, con sviluppo più

[8] Orsini, Maiuscola ogivale inclinata, 92, 95–96, 112–116.
[9] Su questo problema vedi *supra* n. 4.
[10] Brock, Syriac on Sinai, 106 e n. 16, 112. Facsimile integrale del codice: Hjelt, *Syrus Sinaiticus.*
[11] Su queste unità palinseste, di cui si discuterà *infra*, vedi Voicu, Frammenti.
[12] Vedi l'*abstract* in http://www.uco.es/ucopress/images/ocs/copyists/Zaki.pdf (ultimo accesso: 01.07.2023).
[13] È la denominazione usata da Perria, Vat. gr. 2200, 58–61; si veda inoltre Crisci, Esperienze grafiche.

contenuto delle aste e dei tratti obliqui e prevalenza di forme tendenti al quadrato, a volte più agile, con tratti più leggeri, sottili e sinuosi che si prolungano negli spazi interlineari. Risulta attestata in numerosi manoscritti sinaitici – per lo più di contenuto liturgico – riferibili al IX secolo.

Tra i palinsesti qui studiati questa tipologia grafica è attestata in due manoscritti (Tab. 3), copiati da mani diverse.

Mss/UTO	Datazione
Sin. geo. 49, UTO 7	801–900 AD
Sin. gr. 699, UTO 5	801–900 AD

Tab. 3: Scrittura mista

Altri manoscritti sinaitici studiati nell'ambito del Sinai Palimpsests Project copiati in "scrittura mista" sono: Sin. ar. 514, ff. 47 e 52 (*Diktyon* 58317), contenenti una liturgia funebre, attribuiti al sec. X da Agamemnon Tselikas (fonte SPP);[14] Sin. gr. NF MG 29, *scriptio superior*, attribuibile al sec. IX (fonte SPP); Sin. gr. NF MG 99 (*Diktyon* 61137), *scriptio superior*, attribuibile al sec. IX (fonte SPP).

1.3. Le minuscole

Le minuscole attestate nei palinsesti studiati sono di varie tipologie (Tab. 4).

Mss / unità	Scrittura	Datazione
Sin. gr. 2053, UTO 1	Minuscola di area sinaitico-palestinese	801–900
Sin. gr. 446, UTO 3	Minuscola di area sinaitico-palestinese	801–900
Sin. geo. 49, UTO 4	Minuscola di area sinaitico-palestinese (A)	801–900
Sin. geo. 49, UTO 5	Minuscola di area sinaitico-palestinese (B)	801–900
Sin. syr. NF M 42 (CPA), UTO 1	Minuscola rotonda	900–925
Sin. geo. NF frg. 72a, UTO 1	Minuscola informale	951–1000
Sin. gr. 699, UTO 6	Minuscola dell'Italia meridionale	951–1050
Sin. gr. NF M 130, UTO 1	Minuscola dell'Italia meridionale	1001–1100
Sin. gr. NF M 48, UTO 1	Minuscola informale	1001–1100

Tab. 4: Scritture minuscole

In questa sede si vuole richiamare l'attenzione sulla tipologia più diffusamente attestata, che rientra tra le esperienze di adattamento di corsive documentarie per la trascrizione dei libri in area sinaitico-palestinese e presenta le seguenti principali caratteristiche: asse diritto, *ductus* corsivo, disegno tondeggiante, *epsilon* in legamento realizzato mediante raddoppiamento del tratto superiore ascendente; *theta* aperto a sinistra e legato dal basso a lettera seguente; tratti verticali di *eta*, *kappa* e *iota* raddoppiati in legamento con lettera precedente; *sigma* a forma di "alambicco"; *tau* eseguito in un unico movimento e occhiellato.

Le espressioni grafiche sinaitico-palestinesi – e soprattutto i tentativi di normalizzazione della corsiva per usi librari – rimasero limitate e circoscritte geograficamente, a differenza di quelle che, più o meno nello stesso periodo, si andavano definendo in ambiente studita e che hanno assunto maggiore impatto normativo.[15]

[14] Sulla datazione al X secolo proposta da Tselikas nutro alcuni dubbi; per la storia della scrittura risulta più sostenibile una datazione al IX secolo.

[15] È utile precisare che le minuscole di area sinaitico-palestinese dei rotoli Sin. geo. 49, UTO 4 e UTO 5, appartengono a mani differenti.

2. I LIBRI

Le tipologie librarie dei 32 palinsesti studiati sono il codice (27) e il rotolo (4), con 2 casi di tipologia incerta (Tab. 5).

Mss /UTO	Datazione	Tipologia libraria
Sin. geo. 49, UTO 1	0501–0600	Codice
Sin. syr. 30, UTO 1	0501–0600	Codice
Sin. gr. NF MG 29, UTO 1	0551–0600	Codice
Sin. geo. NF frg. 73a, UTO 1	0551–0650	Codice
Sin. geo. 49, UTO 3	0551–0650	Codice
Sin. syr. 30, UTO 2	0601–0700	Codice
Sin. syr. 30, UTO 3	0601–0700	Codice
Sin. gr. 699, UTO 1	0701–0800	Codice
Sin. gr. NF MG 2, UTO 1	0701–0800	Codice
Sin. gr. NF MG 29, UTO 2	0751–0800	Codice
Sin. gr. 2053, UTO 1	0801–0900	Codice
Sin. gr. 2053, UTO 2	0801–0900	Codice
Sin. gr. 699, UTO 2	0801–0900	Codice
Sin. gr. 699, UTO 3	0801–0900	Codice
Sin. gr. 699, UTO 4	0801–0900	Codice
Sin. geo. 49, UTO 2	0801–0900	Codice
Sin. geo. 49, UTO 6	0801–0900	Codice ?
Sin. gr. 699, UTO 5	0801–0900	Codice
Sin. gr. NF MG 2, UTO 2	0850–0900	Codice
Sin. gr. NF MG 2, UTO 3	0850–0900	Codice
Sin. gr. 446, UTO 1	0850–0950	Codice
Sin. gr. 446, UTO 2	0850–0950	Codice
Sin. syr. NF M 42 (CPA), UTO 1	0900–0925	Codice
Sin. geo. NF frg. 72a, UTO 1	0951–1000	Codice
Sin. gr. 699, UTO 6	1001–1100	Codice
Sin. gr. NF M 130, UTO 1	1001–1100	Codice
Sin. gr. NF M 48, UTO 1	1001–1100	Codice
Sin. gr. 446, UTO 3	0801–0900	Rotolo
Sin. geo. 49, UTO 4	0801–0900	Rotolo
Sin. geo. 49, UTO 5	0801–0900	Rotolo

Sin. geo. 49, UTO 7	0801–0900	Rotolo ?
Sin. gr. 2053, UTO 3	0801–0900	Rotolo

Tab. 5: Tipologie librarie

Per alcuni palinsesti è stato possibile – dopo aver identificato il testo – ricostruire, oltre alla tipologia libraria, anche l'ordine e la successione di gruppi più o meno cospicui di fogli, per i quali si rimanda al sito del progetto Sinai Palimpsests Project. Qui, invece, si è scelto di presentare solo alcune ipotesi di ricostruzione che appaiono più signficative dal punto di vista codicologico.

L'unità UTO 5 del Sin. geo. 49, contenente la Liturgia di San Giacomo, è costituita da pezzi di un originario rotolo liturgico, copiato in una minuscola di area sinaitico-palestinese e – in qualità di *Auszeichnungsmajuskel* usata per le rubriche liturgiche – in maiuscola ogivale inclinata. È possibile ricostruire il rotolo originario, nonostante qualche piccola lacuna testuale (Tab. 6).[16]

Fogli	Testo (ed. Mercier)	Cuciture tra i fogli	Testo (ed. Mercier)	Fogli
76v	pp. 164.25–166.6+168.5–7	x	bianco	76r
75r	p. 168.7–12		bianco	75v
63r int.	p. 172.13–16		bianco	63v int.
56v	pp. 172.17–19+174.26–176.2		bianco	56r
52v	pp. 182.23–184.7		?	52r
51r	p. 184.15–21		?	51v
106v	p. 190.20–25		?	106r
109r	pp. 190.25–192.4	x	pp. 240.26–242.6	109v est.
100r	p. 192.4–14		p. 240.2–19	100v
99v	p. 192.14–25		pp. 238.12–240.2	99r
74v	p. 194.2–9		p. 238.5–10	74r
77r int.	p. 194.10–13		pp. 229.19–230.2	77v int.
50v	p. 194.14–20	x	pp. 226.22–228.6	50r
102v	p. 194.23–28		p. 226.8–21	102r
97r	pp. 196.6–16+198.12–20		pp. 224.22–226.8	97v
96v	pp. 198.22–200.1		p. 224.10–17	96r
103r	pp. 200.1–3+200.8–15	x	p. 224.3–9	103v
101v	pp. 200.17–202.3		pp. 222.5–7+222.24–224.3	101r
98r	p. 202.4–17		pp. 220.12–17+220.24–222.5	98v
110v	pp. 204.14–206.1		pp. 216.15–218.7	110r
105r	p. 206.1–15		p. 216.6–15	105v
77v est.	p. 210.6–13		p. 210.15–19	77r est.

Tab. 6: Ricostruzione del rotolo Sin. geo. 49, UTO 5

[16] Edizione di riferimento: Mercier, *Liturgie de Saint Jacques*. Nel rotolo la parte iniziale del testo (corrispondente alle pp. 160–164 dell'edizione Mercier) è andata persa. Inoltre, si avverte che nella Tab. 6 la sequenza testuale – trattandosi di un rotolo scritto su entrambi i lati – va dall'alto verso il basso nelle prime due colonne e dal basso verso l'alto nelle ultime due colonne.

Nel codice Sin. syr. 30 ci sono tre unità palinseste greche, per le quali si possono formulare ipotesi di ricostruzione. Per la UTO 1 (Vangelo di Giovanni) è possibile ricostruire l'ordine dei fogli nel modo seguente:[17]

142r (coll. a–b): 6:68–7:6
142v (coll. a–b): 7:6–15
144v (coll. a–b): 7:15–23
144r (coll. a–b): 7:23–31

147v (coll. a–b): 8:51–9:1
147r (coll. a–b): 9:2–9
149r (coll. a–b): 9:9–16
149v (coll. a–b): 9:17–23

Questi fogli conservano due sezioni di testo (Giovanni 6:68–7:31 e 8:53–9:23), con una lacuna (Giovanni 7.31–7:52, 7:53–8:11 [*Pericope Adulterae*], 8:12–8:51), che occupa – secondo il *layout* del manoscritto (2 colonne di 25 righe ciascuna) – circa 18 colonne di scrittura (= 9 pagine, i.e. 4 fogli + 1 pagina). Se si ipotizza l'assenza della *Pericope Adulterae* (equivalente a 2 colonne di scrittura nel manoscritto), il testo perso occupa circa 16 colonne (= 8 pagine, i.e. 4 fogli): questi 4 fogli persi possono coincidere con i due bifogli centrali del quaternione.

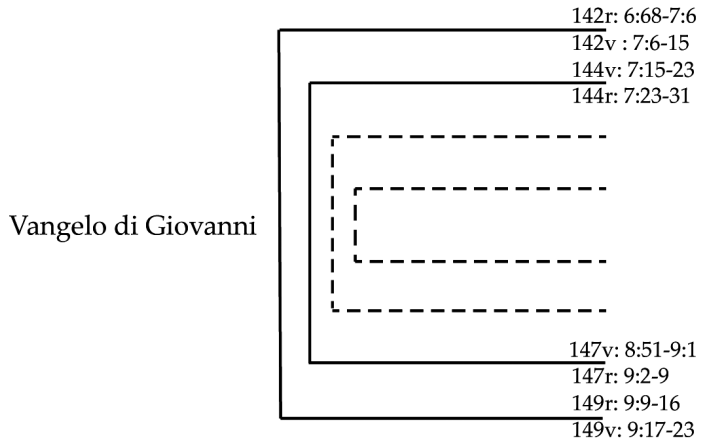


Fig. 1: Ricostruzione del fascicolo contenente il Vangelo di Giovanni
(© Pasquale Orsini)

Per la UTO 2 (Ps.-Macario/Simeone, *Epistula magna*) è possibile ricostruire l'ordine dei fogli nel modo seguente:[18]

176r: 270.7–24
176v: 270.24–271.16

182r: 274.2–16
181v: 274.18–275.12
181r: 275.12–276.5
172v: 276.5–277.6
172r: 277.7–14; 279.15–280.1
171v: 280.1–17
171r: 280.17–281.13

[17] Edizione di riferimento: Nestle, Aland 28. Su questa UTO vedi anche Guignard, 0323: A Forgotten.
[18] Edizione di riferimento: Jaeger, *Two Rediscovered Works*.

177r: 283.6–20
177v: 283.21–284.5; 285.7–14

Tra f. 176v (271.16) e f. 182r (274.2) mancano 52 righe dell'edizione Jaeger, che equivalgono a circa tre colonne di scrittura secondo il *layout* del manoscritto (1 colonna di 30 righe di scrittura), vale a dire 1 foglio + 1 pagina. Tra f. 171r (281.13) e f. 177r (283.6) mancano 39 righe dell'edizione Jaeger, che equivalgono a due colonne e mezza del manoscritto, vale a dire 1 foglio + mezza pagina. Queste lacune corrispondono ad un bifolio (il secondo nel fascicolo, se questo fosse stato un quaternione) e ad una pagina persa (quella non leggibile del f. 182v).

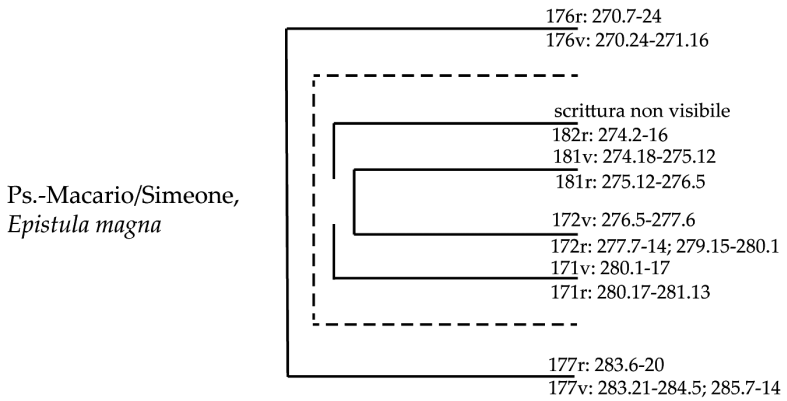


Fig. 2: Ricostruzione del fascicolo contenente Ps.-Macario/Simeone, *Epistula magna* (© Pasquale Orsini)

Per la UTO 3 (Efrem Siro, *Sermo asceticus*) è possibile ricostruire l'ordine dei fogli nel modo seguente:[19]

178r: 45 D 6–F 6
178v: 45 F 6–46 B 6
174v: 46 B 6–D 8
174r: 46 D 8–47 A 5
173r: 47 A 5–C 8
173v: 47 C 8–F 4

180r: 48 F 6–49 A 7
180v: 49 A 8–C 1
179v: 49 C 1–D 7
179r: 49 D 8–F 6
175r: 49 F 6–50 B 3
175v: 50 B 4–D 5

Il testo del manoscritto presenta molte differenze rispetto alla edizione Assemani. Nonostante ciò, si può stimare che il testo perso tra i ff. 173v e 180r (47 F 4–48 F 6) possa occupare il bifolio centrale del fascicolo, se questo fosse stato un quaternione.

[19] Edizione di riferimento: Assemani, *Ephraem*, 40–70.

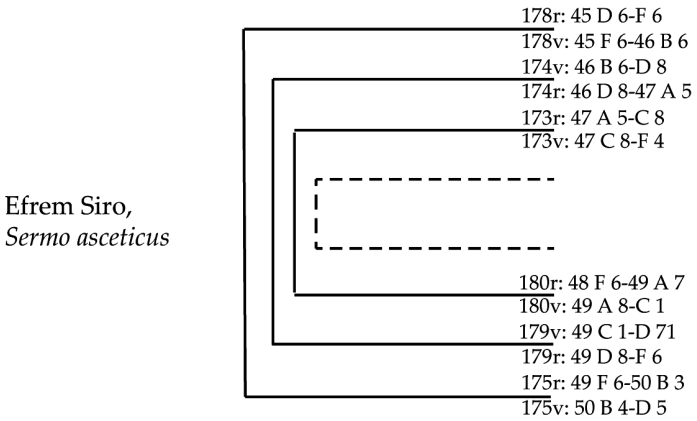


Fig. 3: Ricostruzione del fascicolo contenente Efrem Siro, *Sermo asceticus*
(© Pasquale Orsini)

Inoltre, è utile segnalare che i fogli delle UTO 2 e 3 sono stati copiati dallo stesso copista e originariamente facevano parte, molto probabilmente, dello stesso codice.

Per la UTO 1 del Sin. gr. 446, contenente *In Genesim homiliae 1–67* di Giovanni Crisostomo, anche se non è possibile ricostruire l'intero manoscritto, è tuttavia possibile stabilire l'ordine e la successione di alcuni gruppi di fogli nel modo seguente:[20]

16r: *PG* 53, 307.06–11 (hom. 33)
13v: *PG* 53, 307.12–17 (hom. 33)
17v: *PG* 53, 307.17–23 (hom. 33)
20r: *PG* 53, 307.23–28 (hom. 33)

17r: *PG* 53, 307.28–34 (hom. 33)
20v: *PG* 53, 307.35–39 (hom. 33)
16v: *PG* 53, 307.40–45 (hom. 33)
13r: *PG* 53, 307.45–50 (hom. 33)

15r: *PG* 53, 309.17–22 (hom. 33)
14v: *PG* 53, 309.23–27 (hom. 33)
18v: *PG* 53, 309.27–34 (hom. 33)
19r: *PG* 53, 309.34–39 (hom. 33)

18r: *PG* 53, 309.39–45 (hom. 33)
19v: *PG* 53, 309.46–50 (hom. 33)
15v: *PG* 53, 309.51– 57 (hom. 33)
14r: *PG* 53, 309.57–62 (hom. 33)

9v: *PG* 54, 396.46–49 (hom. 43)
12r: *PG* 54, 396.55–60 (hom. 43)

12v: *PG* 54, 397.01–06 (hom. 43)
9r: *PG* 54, 397.14–18 (hom. 43)

[20] Edizione di riferimento: *PG* 53; *PG* 54.

10v: *PG* 54, 401.24–28 (hom. 43)
11r: *PG* 54, 401.35–38 (hom. 43)

11v: *PG* 54, 401.44–46 (hom. 43)
10r: *PG* 54, 401.55–58 (hom. 43)

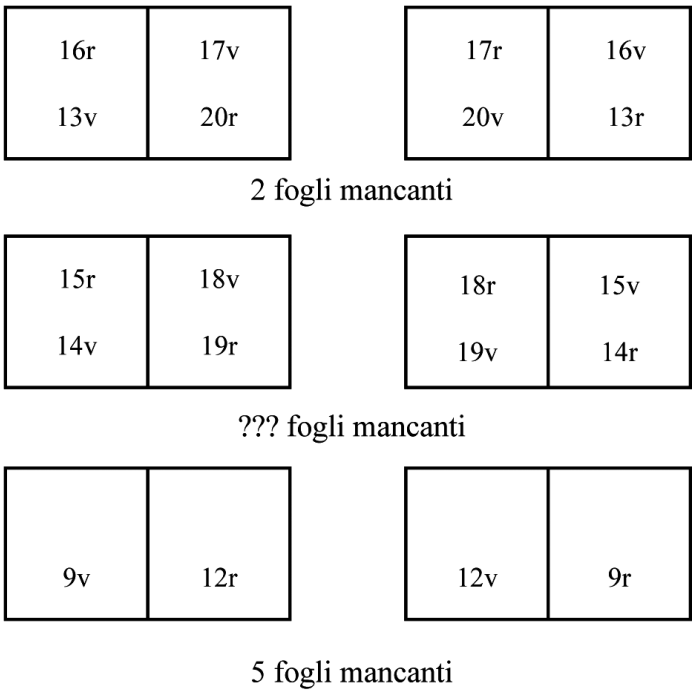
7r: *PG* 54, 402.36–42 (hom. 43)
6v: *PG* 54, 402.42–46 (hom. 43)
2v: *PG* 54, 402.46–53 (hom. 43)
3r: *PG* 54, 402.53–56 (hom. 43)

2r: *PG* 54, 402.56–62 (hom. 43)
3v: *PG* 54, 402.64 –67 (hom. 43)
7v: *PG* 54, 402.67–403.05 (hom. 43)
6r: *PG* 54, 403.06–09 (hom. 43)

8r: *PG* 54, 405.42–47 (hom. 43)
5v: *PG* 54, 405.48–51 (hom. 43)
1v: *PG* 54, 405.52–57 (hom. 43)
4r: *PG* 54, 405.58–63 (hom. 43; 44)

1r: *PG* 54, 405.63–406.06 (hom. 44)
4v: *PG* 54, 406.06–10 (hom. 44)
8v: *PG* 54, 406.10–15 (hom. 44)
5r: *PG* 54, 406.16–19 (hom. 44)

Tenendo presente che quattro fogli del manoscritto attuale costituiscono un foglio del manoscritto originario – che aveva un *layout* in 2 colonne di circa 30–32 righe ciascuna – si può graficamente riassumere la ricostruzione come nella figura seguente.



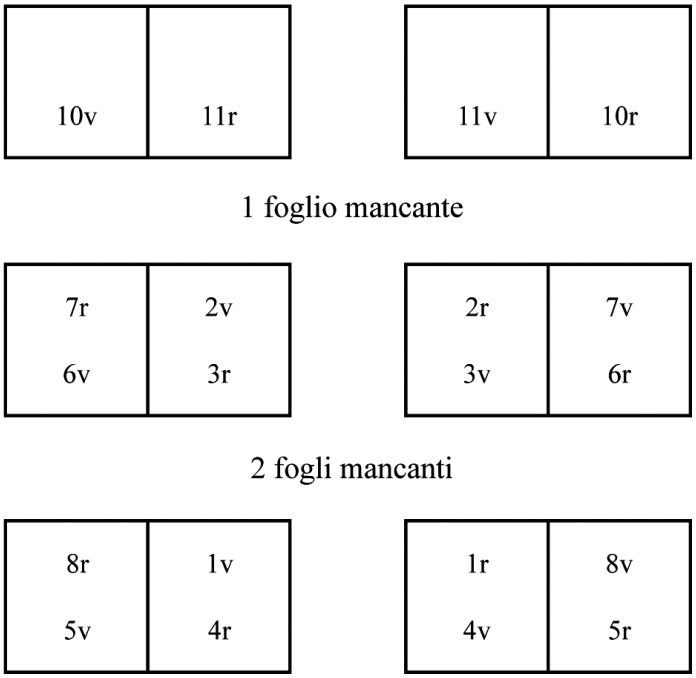


Fig. 4: Ricostruzione dei fogli conententi Giovanni Crisostomo, *In Genesim homiliae 1–67*
(© Pasquale Orsini)

3. I TESTI

Le tipologie testuali attestate nelle unità palinseste studiate sono le seguenti:

Tipologie	Unità
Liturgica	13
Biblia	6
Homiletica	5
Ascetica	3
Biblica	1
Historica	1
Poetica	1
Testi non identificati	2

Tab. 7: Tipologie testuali

In questa sede si è ritenuto utile segnalare solo i nuovi testi che sono stati scoperti grazie alle immagini prodotte nell'ambito del Sinai Palimpsests Project. Per tutti gli altri testi si rinvia, per un maggiore dettaglio, al sito internet più volte richiamato.

Innanzitutto, occorre segnalare l'unico frammento – fino ad ora noto – di testo in copto tra i manoscritti conservati nella biblioteca del Monastero di Santa Caterina del Monte Sinai. Si tratta del pezzo inferiore del f. 44 del manoscritto Sin. geo. 49, che costituisce la UTO 6. Non è stato possibile identificare il testo, a causa della scarsa leggibilità della scrittura.[21]

Sempre nel codice Sin. geo. 49 la UTO 3, insieme ai 4 fogli del Sin. geo. NF frg. 73a, conserva un cospicuo frammento (ca. 46 fogli superstiti) di un poema cristiano in esametri, che non è stato possibile identificare in

[21] Sono visibili solo alcune lettere; alla riga 3 è possibile proporre la lettura ⲉⲃⲟⲗ ϩⲉⲛ.

una opera edita. Parole usate frequentemente sono Ἀβραάμ, Ἴσακος, Χριστόν, Ἰάκωβος, Αἰγύπτοιο. Inoltre, di seguito si riportano alcune significative letture:

f. 58r: ναιέμεναι (attestato in Omero, *Od.* 15.240)
κεῖτο πάρος (in Omero, *Il.* 22.403)
ἄμφεπον (in contesto omerico)
f. 61v: ζοφοειδέι (solo in Nonno, *Dionysiaca*, 38.35: ὑπὸ ζοφοειδέι κώνῳ)
f. 112r: ἐφάψατο (solo in Pindaro, *Ol*. 1.86, *Py*. 8.60, e Eudocia Augusta, *Homerocentones*)

Questi fogli, inoltre, risultano *bis rescripti*: infatti – come si è già precedentemente accennato – su questo testo greco si trova un testo (non identificato, ma di contenuto cristiano)[22] scritto in arabo e attribuito al X secolo da Alexander Treiger (fonte SPP). Pertanto, questa unità palinsesta risulta interessante anche dal punto di vista codicologico. Infatti, questi fogli sono stati usati una prima volta in greco per scrivere un codice (sec. VI med.–VII med.); una seconda volta, smembrato il codice greco, sono stati riusati per farne un rotolo in arabo (sec. X); infine, dal rotolo arabo sono stati tratti i bifoli per fare un codice in georgiano (sec. XIII).

Infine, un altro testo interessante è quello conservato nella UTO 2 del manoscritto Sin. gr. 446. Non è stato possibile identificare il testo, tuttavia appare molto probabile che si tratti di un testo liturgico relativo alla benedizione delle acque per l'Epifania.[23] Di seguito si riportano alcune significative letture:

f. 21r: Διὰ τοῦ βαπτίσματός σου, Χριστέ, διάβολον ᾔσχυνας: Follieri, *Initia Hymnorum* I, 310
f. 21v: Καθορῶν σε ἐν τοῖς ῥείθροις τοῦ Ἰορδάνου
f. 25v: Πρὸς τὰ ἰορδάνια ὕδατα
f. 30r: Ὁ τὸ φῶς ἀναβαλλόμενος θεικῶς: Follieri, *Initia Hymnorum* III, 204
f. 30r: Ὁ βαπτισθεὶς ἐν Ἰορδάνῃ καὶ ἁγιάσας τὰ ὕδατα τῇ παρουσίᾳ σου Χριστέ
f. 49rv: Πίστιν ἀρραγῆ, τὴν τῆς Αἱμόρρου Πάτερ – Τῶν σῶν μεμνημένοι διδαγμάτων, Θεοδόσιε (Meneo, 12 gennaio, ὨΙδὴ η΄–θ΄): *Μηναῖα* III, 211.9–16, 28–35

Ricorre diverse volte (ff. 26r, 41r, 54r, 65r, 66v, 138r) la nota marginale Ἰωά[ννου] μ[ονα]χ[οῦ].

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[22] Per i fogli palinsesti del Sin. geo. NF frg. 73a Treiger descrive il "genere" del contenuto con l'espressione *Christian Theology or Ethics*; per la UTO 3 del Sin. geo. 49, invece, lo studioso definisce il testo *Unknown Christian Arabic Work or Works*.

[23] Non è stato possibile ricostruire la successione e l'ordine di tutti i fogli; tuttavia una sequenza certa è la seguente: ff. 138r+137v e 138v+137r.

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Michelle P. Brown

Arabic NF 8 and the Latin Manuscripts of St. Catherine's Monastery in the Sinai

The Monastery of St. Catherine, at the foot of Mounts Horeb and Sinai, forms an extraordinary crossroads at which the different traditions of East and West have met over the centuries. It has been a place of pilgrimage since at least the late 4th century, when the Spanish woman Egeria/Etheria visited. It has been home to Greek, Syrian, Arab, Georgian, Slavic, and Latin-speaking monks, all espousing orthodoxy as expressed at the Council of Chalcedon (451), requiring books in their own languages. Around two thirds of Sinai's medieval books are in Greek; a majority of the rest are Christian Arabic texts; and the remainder are in various languages, predominantly Syriac, Georgian, and Slavic. Some are Greek-Arabic bilinguals for use by Arabic Christians and Greek monks raised in Muslim territories (such as Syria, Egypt, and Sinai itself) who increasingly spoke Arabic as their first language and Greek as their second.

Sinai has always been a meeting place of cultures. It is not surprising that its collections reflect this, but miraculous that they have survived the vagaries of history. The New Finds that were uncovered in 1975 indicate that it still has much to tell us about the formation of culture in the eastern Mediterranean, and the Latin New Finds, in particular, promise to cast significant new light upon relations between East and West during the formative historical period of the Middle Ages.

Amongst the most important of Byzantine monasteries, St. Catherine's was founded by Emperor Justinian between 548 and 565, building upon a tradition of Christian eremitic monasticism on the site that was already centuries old. Its remote location and its international diplomatic network ensured survival across the centuries, and despite losses it retains mosaics and icons from the time of its foundation onwards and over 4,500 manuscripts (of which some 170 items are palimpsested)—part of the greatest library held by any Orthodox monastery.[1] This collection began to be known to the West when Konstantin Tischendorf discovered part of the earliest Christian Bible, *Codex Sinaiticus*, there in 1844. A further important cache of books was discovered there in 1975, in a sealed room in the Tower of St. George, seemingly considered to contain redundant items and forgotten when the library was moved to new accommodations elsewhere in the monastery in 1734. These included a missing portion of the famed *Codex Sinaiticus* itself and increased the amount of known material from St. Catherine's library by about a third. Some of these New Finds have been catalogued (with priority having been accorded to the Greek and Syriac materials) and international initiatives are underway to conserve, preserve, and digitise parts of the library's holdings.[2]

Many manuscripts survive from St. Catherine's, mostly service books but also Biblical, patristic, study texts, medicinal texts, and romances (mostly of a Christian, hagiographical character), along with documents. These include a number from the mid-5th to the 9th centuries, some written over earlier erased texts, with up to three layers of palimpsests in some cases, which are being recovered with the aid of high-resolution digital imaging as part of the Sinai Palimpsests Project. They are mostly in rounded majuscule scripts inherited from Greece and Rome, with some penned in minuscule scripts from the 7th/8th and 9th centuries. Although these early manuscripts do not generally contain figural imagery (with the exception of the fragment from an illustrated Latin *History of Apollonius of Tyre*, probably from 6th-century Rome, and an illustrated botanical work in Greek, perhaps by Crateuas, of 5th or 6th-century date), probably being influenced in this by influence from Islam and from Byzantine iconoclasts, their decoration includes fish-shaped initials resembling those of pre-Carolingian Italy and Gaul, perhaps inspired by gifts of books from these areas. The end of Iconoclasm in Byzantium, coupled

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[1] For the history of the monastery and its library, see the contribution by Father Justin Sinaites in this volume.

[2] I have been charged by the monastic community with cataloguing the Latin manuscripts at St. Catherine's. This work is ongoing, and has resulted in many publications, some of which are mentioned here.

with the wealth of Fatimid Egypt, meant that from the 10th century more opulent illuminated books were made at Sinai, such as the Lectionary of Mount Horeb. By 1000, Constantinople had re-emerged as the central focus of Byzantine culture and its influence can be clearly seen in manuscripts subsequently imported into Sinai and produced there, which feature important Byzantine-style illuminations. A significant number of Georgian manuscripts are also represented, made in the 10th to 14th centuries, when Georgian monasteries were flourishing in Syria and Palestine and producing recruits for the Sinai community. Sinai's Slavonic books, probably later imports from Macedonia and Croatia, include two 11th-century items in the Glagolitic language—from which Cyrillic is derived—which are amongst the earliest surviving Slavonic manuscripts.[3]

One element missing from this multi-lingual, multi-cultural mix was the book culture of the Latin West, which historically was not expected to be represented as Latin speakers were not thought to have been present in the Levant prior to the Crusades, from the late 11th century onwards. Awareness of the Latin New Finds should significantly change this perspective.

During a visit to the monastery in January 2009, I was able to identify several items, most of them fragmentary, in Latin. A couple were bound, most were fragments (some from bindings), and some were contained in 39 envelopes of fragments bearing Latin script. Most of these came from amongst the New Finds. Adding these to my searches in the archives and work by myself and others[4] on the high-level digitisation of the palimpsested materials from the monastery provided by the Sinai Palimpsests Project, which added a few further fragments to the corpus, I currently know of portions of some 55 Latin manuscripts to date, ranging from the 5th/6th to 16th centuries. It is extremely rare for new materials from the early Latin West to be discovered, especially bearing decoration or neumatic notation, and these items therefore represent an important addition to the early medieval corpus. Furthermore, their presence in the region, and perceptible impact upon the Greek Orthodox culture of the Middle East, opens up historical consideration of an unexpected amount of interaction between the eastern and western churches long before the Crusades.

The range of Latin materials that I have so far identified at the monastery indicates the presence within the medieval library of St. Catherine's of a range of Latin Biblical and liturgical manuscripts of probable 6th- to 10th-century date. Some were probably imports and include what may have been gifts from Pope Gregory's Rome, along with examples of neumatic notation from the Carolingian Empire; others were written at St. Catherine's or in the Christian Orient. There is also important evidence suggesting the presence of western scribes working at Sinai and of the output of Latin manuscripts at St. Catherine's itself, indicating that it was catering for a considerable pilgrim presence throughout the Middle Ages. The archives also yield significant and unexpected evidence relating to Sinai's international relations following the Crusades, up to the 18th century, and include material such as the only extant letters of introduction and safe passage on behalf of medieval pilgrims, and testimonies by pilgrims on how they were received at Sinai. The nature of St. Catherine's western property holdings from the 9th century onwards and the diplomatic role of the monastery as a vital bridgehead between East and West are also illuminated by these materials, as are late medieval and early modern diplomatic and commercial relations with Italian merchants, the Doge, and the Spanish monarchy.[5]

The Latin material at St. Catherine's is thus revealing a complex and significant picture of interaction of personnel and materials across the imaginary historiographical early medieval East-West divide, including evidence for direct and indirect cultural contact between the Insular world (Britain, Ireland and Brittany) and the eastern Mediterranean.[6] I am currently working to pull together all of the Latin manuscript materials from

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[3] See also the contribution by Claudia Rapp in this volume.

[4] Sin. gr. NF M 48 was found by David Ganz (see the relevant Sinai Palimpsests Project entry) to contain, in the erased layer, 22 fragments of a hymnal with texts by Prudentius, Fortunatus, prayers and other devotional materials in a Visigothic minuscule script which he characterized as of 9th- to 10th-century date and attributed, owing to its blend of palaeographical features, to an eastern Mediterranean origin, following my characterization of other Latin manuscripts at St. Catherine's. Its fish initial on f. 2r, in Merovingian style, recalls the senmurv initial in the Insular pocket Gospel book fragments in Sin. ar. NF 8. The hymnal was palimpsested to make way for a liturgical Typikon in Greek minuscule during the 11th century and then palimpsested again with prayers for matins and vespers in Greek minuscule during the 14th century. David Ganz also initially identified the Apollonius text in Sin. ar. NF 8, on which more below.

[5] Brown, *Latin Manuscripts of the Holy Monastery of St Catherine.*

[6] Brown, The Eastwardness of Things; Brown, Imagining, Imaging and Experiencing the East; Brown, The Bridge in the Desert: Brown, Were Early Medieval Picture Cycles recycled?

the monastery in a single catalogue and to preface this with a substantial historical introduction in which the circumstances of cross-cultural interaction are explored and contextualized.

I was invited by the Sinai Palimpsests Project to be one of the scholars to work on the Latin palimpsests at St. Catherine's Monastery, along with David Ganz, later joined by Daniela Mairhofer. One of the most notable manuscripts with Latin erased text is Arabic New Finds 8 (Sin. ar. NF 8). The folios of this manuscript are sewn together from several palimpsested pieces and contain, *inter alia*, medical material by an early 6th-century Greek hand, and a fragment of a magnificent, illustrated Latin copy of the *History of Apollonius of Tyre*, perhaps made in 6th-century Rome (see Fig. 2). Several Biblical texts in Latin are copied by Roman hands of 6th-century date and by two 8th-century Insular hands (probably Northumbrians, but displaying some Mercian influence). All of these were erased and over-written, in turn, in kufic script, by a Christian Arabic scribe in the second half of the 9th century, resulting in a codicologically complex manuscript which is among the earliest extant Gospel texts in Arabic.

A further manuscript that speaks to the extensive cultural connection between the West and the East, as crystallized in the Sinai material, is Sin. lat. NF 1. In 2006, when I curated the exhibition 'Bibles Before the Year 1000' at the Smithsonian Institute, we were graced with the loan not only of the newly discovered portion of *Codex Sinaiticus*, but also with ff. 19v–20r of this manuscript, written in Sinai or the Christian Orient during the 10th century.[7] This Latin Psalter was not recognized as such until the 20th century as it was initially misidentified as a Slavonic manuscript. Elias A. Lowe discerned a scribal familiarity with Visigothic, Greek, Syriac, and Arabic palaeographical features in this and two other contemporary Latin fragments in the same collection, but I would suggest that the closest analogies for some of the features of its script and decoration can be found within the pre-Carolingian scriptoria of Gaul and of Irish foundations on the Continent, such as Luxeuil, St. Gall and Bobbio—all founded by St. Columbanus by 600. Western influence is also reflected in the illumination, with zoomorphic initials, resembling those of pre-Carolingian Gaul and provincial Greek illumination (such as that of southern Italy), combined with Insular-style interlace. The significance of the fragments already published by E.A. Lowe and Bonifatius Fischer, and until now thought to have come to the monastery later in the Middle Ages,[8] must be reappraised in view of the other early medieval Latin manuscripts at the monastery. Together, they paint a very different picture of early East/West relations, indicating the possibility of considerable post-Roman interaction between the churches of East and West.

What then was the historical context that enabled such unexpected cultural interaction in this desert wilderness? In 599 Pope Gregory the Great sent a letter from Rome to Sinai along with gifts, and this would have been one possible route of such influence on the Sinai scriptorium. Input and gifts from pilgrims visiting from Northern Europe would have been another. For this was a time when the Monastery of St. Catherine served as the guarantor of safe passage throughout the Levant through its dispensation from the Prophet Muhammad. Around 640 the Sinai region had come under Arab rule, and an alleged letter of protection was besought of the Prophet Muhammad by the Sinai monks. The original document (of which a copy survives) was presented by the monks to Sultan Selim I in 1517, when he became Caliph of Islam. But such a document would have been especially important during the persecution of Christians in Egypt around the year 1000, and there are parallels with other 7th-century letters of protection which support the original document's early date. The document grants the monks the right to dwell unmolested at the monastery and accords the right of safe passage throughout Islamic territory to any visiting pilgrims. Anyone wishing to visit the Holy Land would therefore be able to include St. Catherine's in the itinerary, with the guarantee of a safe passage.

The monastery possessed a range of Latin manuscripts (mostly Biblical and liturgical) of possible 6th- to 10th-century date. Some were probably imports, including possible gifts from Pope Gregory's Rome and some quite early examples of Carolingian neumatic notation. Others would appear to have been written at St. Catherine's or in the neighbouring Christian Orient.

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[7] Brown, *In the Beginning: Bibles Before the Year 1000*, no. 48.

[8] Lowe, An Unknown Latin Psalter on Mount Sinai; Lowe, Two New Latin Liturgical Fragments; Lowe, Two Other Unknown Latin Liturgical Fragments; Vezin, À propos des manuscrits latins du Sinaï. Problèmes de localisation et de datation.

The Latin manuscripts evince an interest at St. Catherine's in the liturgy, music, and scripts of the early medieval West. Indeed, a preoccupation with the visual appearance of scripts may herald the origins of the study of palaeography, for St. Nilus of Sinai, in his treatise on vices, the *Narrations* (also known as Pseudo-Nilus, *Narrations*), criticises indolent young monks who do not concentrate on the meaning of a book but, as a displacement activity, count its leaves and examine its handwriting, complaining of its writing and format.[9] The date and authorship of the *Narrations* is debatable, although a 5th- or 6th-century date is generally accepted, but the earliest evidence of its existence is an excerpt from it, written in Syriac in a Sinai manuscript from St. Catherine's (a Syriac compilation of hagiography and menologia) datable to 886, the scribe of which refers to making his translation from a copy in Greek dated 767.[10] This is the period in which some of the Latin manuscripts from St. Catherine's seem to evince an interest on the part of some of its scribes in studying and absorbing features of western manuscript production. This text also suggests that manuscripts may have been available for study in the Sinai from an early date.

Perhaps the earliest Latin hand from Sinai to survive is a 5th- or 6th-century uncial with rustic capital features—a curious hybrid script with some odd features from other scripts (perhaps Old Roman Cursive and Coptic), which occurs on a fragment that now forms Sin. ar. 588 and consists of ink offsets from a Latin manuscript leaf on the inside cover of a papyrus cartonnage binding. The text is largely illegible, as yet. Similar binding structures have been found from Coptic Egypt and even from as far afield as Ireland, on the *Faddan More Psalter* of ca. 800 (mentioned below, which was excavated in 2006 from a peat bog in Co. Tipperary).[11]

The early Latin materials also encompass palimpsested fragments, which include in their strata half-uncial scripts from 6th-century Italy,[12] some of which may have been among the gifts known to have been sent by Pope Gregory.[13] Some of the non-palimpsested pieces are clumsy copies of early Western scripts, such as Visigothic, Beneventan, Luxeuil, and Caroline minuscule; written in the black carbon ink characteristic of Sinaitic and other Egyptian manuscripts (and essentially the sort of ink used there since ancient times). These may represent attempts by Sinai scribes to copy the scripts of imported Western manuscripts or the hands of foreign scribes they had met.

One such is Sin. lat. NF 4, which blends Visigothic and Caroline minuscule features and is written on paper, which was not available in the West until much later. Other scripts, however, are likely to be Sinai scriptorium products, either by western scribes at work there or by members of an in-house Latin scriptorium which merged Insular, Frankish, Beneventan, other Italian, and Visigothic palaeographical features, sometimes blended with Greek, Syriac, and Arabic codicological features and a characteristic tendency towards a rightwards slant in aspect—a feature of Sinaitic Greek uncial script that may reflect the influence of Semitic scripts.[14]

Some of the fragments had already been palimpsested previously, giving two or three strata of texts which are difficult—and in some cases impossible—to decipher. The Sinai Palimpsests Project's application of high-level digital imaging and enhancement techniques offers the possibility of retrieving some of the lettering, with different images working together to yield different details, but the texts still often remain elusive. Some have proven identifiable, others are so fragmentary that textual recovery is so partial that they cannot be pinned down, even if palaeographical stylistic appraisals are possible.

The Latinate scribes, some of whom I suggest were working at the monastery, had a range of material from other cultural orbits available to them, probably in the form of imported books but also via direct contact with foreign scribes. Indeed, some of the manuscripts may even have been produced by westerners at work in Sinai. This can be demonstrated by one particular book, Sin. ar. NF 8 (henceforward, Arabic NF 8). which was found in the sealed room among the New Finds. It is a fascinating confection of pieces of earlier parchment leaves

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[9] Nilus Sinaita, *Narrationes*, 600; Kornarakis, *The Monastic Life according to Saint Nilus.* The historical identity of Nilus Sinaita (died ca. 430) is a complex and contested issue, but it is generally agreed that the *Narrationes* were composed by an author working in the Sinai and that it reflects, if only in part, circumstances there in the early 5th century. The earliest extant manuscript is of 10th-century date, so it predates this. Whether the *Narrationes* are a post-Roman or early medieval source, they indicate the presence and study of manuscripts in the Sinai in the post-Roman period. See Mayerson, Observations on the 'Nilus' *Narrationes.*

[10] Vat. sir. 623 (*Diktyon* 69457). See Caner, *History and Hagiography from the Late Antique Sinai*, 75–76.

[11] Read, *Faddan More Psalter*.

[12] For example, Sin. ar. NF 8, f. 13v, the lower script in the lower left-hand portion.

[13] Sin. ar. NF 8, f. 21v.

[14] For a Sinaite scribe writing a version of pre-Caroline minuscule, see the flyleaf of Sin. ar. 455.

from a number of manuscripts, palimpsested and sewn together, some of its pages resembling a patchwork quilt of several fragments (some leaves being formed of as many as five fragments), to form a book (now lacking its binding) containing the earliest Arabic language Gospels, written by a Christian scribe writing in Arabic in the second half of the 9th century.[15] It speaks eloquently of the shortage of membrane, as might be expected in the heart of the Sinai desert, for example, and of the sacrifice of earlier works to the needs of the monastic community at a time when Arabic had become the first language of many of the monks.

The lowest strata of the scripts on the pieces of membrane from which Arabic NF 8 was composed consist of Greek majuscule hands of 5th/6th-century date. Some also carry Latin uncials and half uncials by Italian hands, dating to the 6th century. One of these scribes penned a Vulgate Apocalypse/Book of Revelation in uncials/half-uncials of 6th-century date (Arabic NF 8, f. 19v; see Fig. 1) of the sort practised in Gregory the Great's Rome. Another penned Luke's Gospel in Roman uncials, again in the 6th century on another of the fragments used to make f. 19v. Other fragments carry the Latin hands of 7th/8th to 9th-century scribes, including two of Insular origin, some of whom may even have been writing at St. Catherine's.

Fig. 1: Fragment from a Vulgate Apocalypse in Latin uncials / half-uncials, 6th century (Sin. ar. NF 8, f. 19v). Undertext in red (© St. Catherine's Monastery, Sinai, Egypt)

[15] Kashouh, Sinai Ar. N.F. Parchment 8; Kashouh, The Arabic Versions of the Gospels, 76.

The Sinai Palimpsests Project's digital images have made possible the textual identification by David Ganz of fragments incorporated into Arabic NF 8, of the Latin *History of Apollonius of Tyre* (forming parts of ff. 12 and 18), which I have discussed in its palaeographical and art historical contexts.[16] This is written by one of the hands that I have associated with 6th-century Rome. This copy predates the other known (9th–10th century) Latin versions of the text by some way. It is of very fine quality and provides evidence of the sort of Late Antique illustrated cycle that inspired the earliest extant medieval illustrated copy, a fragment now in Hungary (National Széchényi Library, cod. lat. 4),[17] which was made in the Ottonian monastery of Werden in ca. 1000. This contains some 38 line-drawings, executed in crude style but probably ultimately based on something similar to the Sinai fragment.

Amidst the barbarized palimpsested membrane of Arabic NF 8, the sole figural image that has so far been found to survive from this grand Late Antique book, on f. 18r (see Fig. 2), depicts the heads of a man and a young woman, set beneath an architectural device with two columns topped by lotus capitals, which resembles a proscenium theatrical stage.[18] Comparison with the Werden manuscript, which has a similar scene of a man and woman standing in an architectural surround, although the composition and style vary, suggests that the subject of the Sinai fragment is likely Apollonius and his daughter, Tharsia, at the house of the unscrupulous innkeeper, Strangulos (Stranguillo). In the recent publication of the *Apollonius Pictus* manuscript in Hungary, Herbert Kessler discussed the possibilities that the newly-discovered Ottonian picture cycle was either a new early medieval composition, or that it might have been based upon a lost Late Antique prototype. The Sinai Apollonius fragment indicates that Kessler's suspicions were correct and that there was indeed an earlier illustrated Apollonius tradition in Italy by the 6th century.[19]

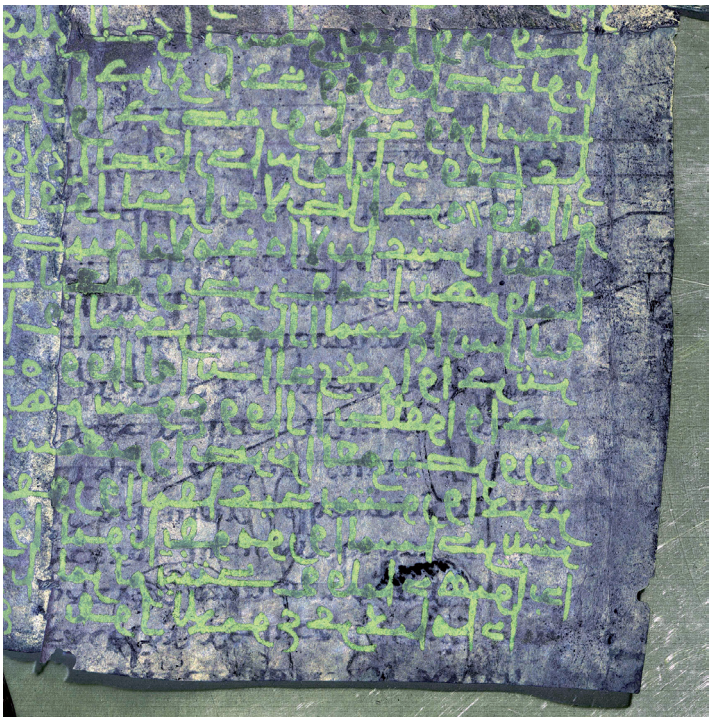

Fig. 2: Fragment from an illustrated Latin copy of the *History of Apollonius of Tyre*, in uncials of 6th-century Roman style, with part of a drawing of a man and girl (probably Apollonius and his daughter, Tharsia) under an architectural cornice supported by lotus-capital columns (Sin. ar. NF 8, f. 18r). Undertext in black (© St. Catherine's Monastery, Sinai, Egypt)

[16] Brown, Bridge in the Desert; Brown, Were Early Medieval Picture Cycles Recycled?

[17] Boreczky and Németh, *Apollonius Pictus*; Boreczky, Illustrated Life of Apollonius and Tarsia; Boreczky, *Apollonius pictus* Reevaluated.

[18] There are also faint remains of possible erased drawings on f. 24v and f. 26r, but these fragments do not appear to carry the script of the Apollonius text.

[19] Brown, Were Early Medieval Picture Cycles Recycled? I am gratefully indebted to Prof. David Ganz for discussions concerning the identification of the text.

The Apollonius manuscript that the Sinai fragment came from would have been large, formally penned in Latin uncial script, and illustrated with ink line drawings. Not enough survives to determine whether there was text in one column, or two, but the drawing is large and artistically accomplished and recalls the scale of the images, set above single columns, in the *Vatican Virgil* (which is coloured, but the aesthetic of which is drawing-based). The Ottonian version is written in Caroline minuscule accompanied by an outline drawing picture cycle. Its subject matter contains a scene to which the Sinai fragment may be compared, but the composition varies, the figure-style is less naturalistic, and the images are of smaller scale. This, and the provenance circumstances, indicate that there must have been other early copies circulating, from one of which the manuscript in Hungary is descended. The Sinai Apollonius would not have been available as an exemplar, for it would appear to have travelled to the Levant and been broken apart and palimpsested there by the late 9th century and probably earlier, for there are traces of another layer of Latin script (still being worked on) between it and the upper Arabic text.

Also of great significance for our present purpose is my discovery in 2009 that other fragments of the palimpsested materials which make up Arabic NF 8 bear the hands of two 8th-century Insular scribes writing Insular minuscule.[20] The Sinai Palimpsests Project images have made it possible to assess more of their relationship to one another and to the other palimpsest strata.[21] On f. 26v these hands occur together, indicating that these two scribes were working alongside one another. The work of one of them, who wrote a formal set minuscule, includes part of a service book including a lection from St. Mark's Gospel, in the Vulgate (f. 15v).[22] This was subsequently over-written by the Christian Arabic scribe in the second half of the 9th century.

The first of the English scribes wrote a compact, rounded Insular 'Phase II' set minuscule (see Fig. 3), recalling the sort of Phase II Insular minuscule script introduced by that of the *Moore Bede*,[23] copied during the 740s at Wearmouth-Jarrow, and that of London, British Library, Egerton 1046. These parallels suggest a mid-8th-century English background.[24] The Insular script on f. 15 incorporates on f. 15v a zoomorphic initial, an uncial E (see Fig. 3), composed of an exotic senmurv—a beast of Persian origin, conflating animal, bird, and fish components to symbolise the union of the elements. This resembles another senmurv found in an initial in the early 9th-century *Mercian Royal Prayer Book* (BL, Royal MS 2.A.xx, f. 17), an example of the exoticism of Mercian art at this period.[25] However, the style of the initial in the palimpsest fragment resembles the Merovingian-inspired zoomorphic initials found in other early Latin manuscripts at St. Catherine's (such as Sin. gr. NF M 48, f. 2r, a 9th- to 10th-century hymnal in a minuscule script with primarily Visigothic features),[26] rather than its more sophisticated Anglo-Saxon counterpart and this, coupled with the eastern pedigree of the beast in question, suggests that the artist-scribe may have been working at the monastery.

Arabic NF 8, f. 15v also features angular Insular display lettering, as continuation script following on from the zoomorphic initial, with multi-coloured infills in a palette of slate-blue, orange, and yellow, reminiscent of display script found in Mercian manuscripts around 800.[27] There are orange, blue, and yellow infills to minor

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[20] Brown, Eastwardness of Things; Brown, Imagining, Imaging and Experiencing the East.

[21] This has clarified exactly where the different strata of scripts occur on any individual folio. The presence of several different hands from different periods and backgrounds on the same folio does not necessarily mean they were related, if the folio in question was made up of more than one fragment. Seeing the different elements clearly in the excellent final Sinai Palimpsests Project images, rather than as disjointed elements, has enabled me to revise somewhat statements in my previous publications concerning how the hands related to one another. The relationships outlined here are the correct ones.

[22] F. 15v, section a i, and f. 18r, section a ii, which are conjoint; it is possible to see the Insular hand most clearly in the section in the gutter (and also on f. 15r), a few lines below the orange zoomorphic initial and display lettering. The pages are usually composed of fragments sewn together; they tend to fall into two or four sectors, which are here numbered a i (top right), a ii (top left), b i (lower left), b ii (lower right) and so forth. The folia comprising fragments of this Insular pocket Gospel book are as follows: ff. 15r, 15v, 18r, 18r, 18v, 19r, 19v, 24r, 24v, 25r, 25r, 25v, 26v (any Insular script on f. 26r has either been completely erased or it was blank), 27r, 27v, 27v. The arrangement of the folia in textual order is as follows: ff. 18r/15v, col. b; 15r; 18v; 25v; 15v; 18r/15v, col. a; 19v; 14v.

[23] Cambridge, Cambridge University Library, MS Kk.v.16.

[24] Brown, Writing in the Insular World.

[25] London, British Library, Royal MS 2.A.xx.

[26] See fn. 4, above.

[27] Such as Oxford, Bodleian Library, MS Hatton 93 (a *primum in ordine* mass text) and Paris, Bibliothèque nationale MS lat. 10861 (a collection of saints' lives). On this, and BL, Royal MS 2.A.xx and other related manuscripts, see Brown, Mercian Manuscripts, and Brown, Imagining, Imaging, and Experiencing the East.

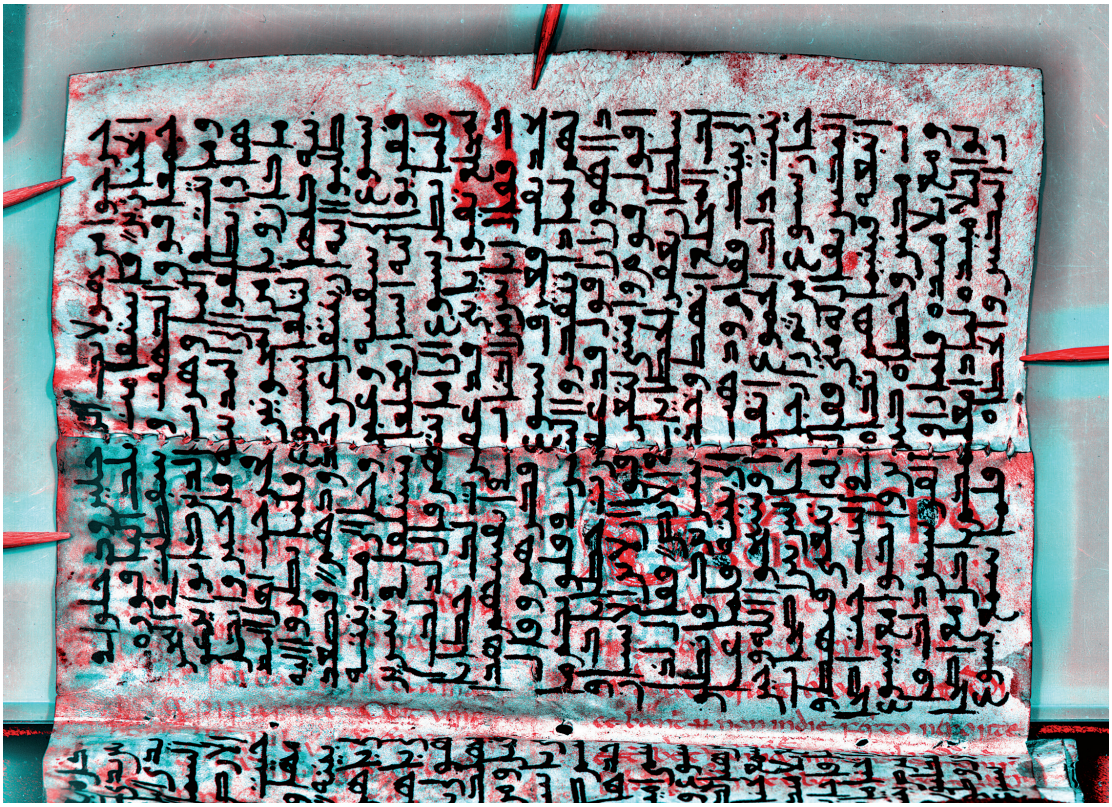

Fig. 3: Fragment of an Insular pocket Gospel book, with zoomorphic initial E formed of a Persian senmurv and Insular display script of Mercian style of ca. 800 (Sin. ar. NF 8, f. 15v). Undertext in red (© St. Catherine's Monastery, Sinai, Egypt)

initials and *litterae notabiliores*. A few interlinear corrections or glosses occur on f. 26v, marked with forward slashes. There is a dedication cross at the top left of f. 25r, a feature found in Insular scriptural manuscripts from Wearmouth-Jarrow, and their derivatives, in the 8th century. Another 8th-century Insular scribe who wrote an Insular Phase II minuscule similar to that of the first scribe, but more cursive in ductus, is to be found in other parts of the erased layers of what now forms Arabic NF 8 (see f. 26v, for example). The more formal of the hands penned Mark 15 on ff. 19r–v (Mark 14 opens on f. 15v with the red zoomorphic senmurv initial and coloured display script). The same hand appears on fragments forming part of ff. 15, 19, 25, 26, and 27. The second Insular, cursive minuscule, hand was probably writing a liturgical text (resembling the first Eucharistic prayer from the Roman Missal) and appears on ff. 24–26.

There were, therefore, at least two English scribes whose work is represented in the cache of materials drawn upon to form Arabic NF 8 in the late 9th century, and both ff. 25 and 27 were formed by sewing together two separate fragments of the Insular pocket Gospel book in which they appear, perhaps suggesting it had already been dismembered and was in small pieces. Stylistic features and the context of the non-palimpsested Latin manuscripts from St. Catherine's raise the possibility that these Insular scribes may even have been at work at St. Catherine's during the second half of the 8th century, and that their hands had been influenced by mid-8th-century Northumbrian scripts and by late 9th-century Mercian illumination, as well as eastern art forms.

The components of some of the composite leaves of Arabic NF 8 give an insight into how Latin manuscripts featured in the cache of membrane that the Arabic scribe drew upon to palimpsest and sew together to make his Arabic Gospel book. Those fragments forming f. 19 are a good case in point:

On f. 19v the top right section is by the same 8th-century Insular minuscule hand as the f. 15 fragment, it carries Mark 15.40–42 and is part of the Insular pocket Gospel book as the related fragments which form parts of ff. 15r, 15v, 18r (upper outer piece and piece along gutter), 18v, 19r, 19v, 24r, 24v, 25r (inner and outer pieces), 25v (inner and outer pieces), 26v, 27r (inner and outer pieces), 27v (inner and outer pieces).

The bottom left panel of f. 19v bears part of the text of Ecclesiasticus in a 6th-century Greek majuscule hand, which has been palimpsested by a 9th-century Greek sloping majuscule hand (text unidentified), which is in turn palimpsested soon after by the Arabic hand. Another fragment with the same stratification is f. 14r. On f. 19r only the Ecclesiasticus hand and the Arabic hand appear.

The top left panel of f. 19v is a Latin text of the Apocalypse/Book of Revelation, written in a Roman mixed uncial hand with half-uncial letter-forms. This continues on f. 19r, although it has been quite well erased and palimpsested by the Arabic hand.

The bottom right panel of f. 19v bears a stately Roman 6th-century uncial hand which wrote Luke 4.18 (Vetus Latina version) in two columns which has been palimpsested by the Arabic text. On f. 19r the Vetus Latina Gospel text has been thoroughly erased and palimpsested by a hand which writes a Roman-style (6th or 7th-century?) mixed capitalis-uncialis script also exhibiting some pre-Caroline minuscule features such as tall theta e and looped o (this is akin to the Latin hand which wrote a text of which the words 'amnos de notturna' can be clearly seen on f. 13r), the remaining text of which has yet to be recovered but which starts 'pro no/as…' and ends '…bentuti' on its first line. This resembles other post-Roman hands in the non-palimpsest Latin manuscripts at St. Catherine's Monastery. The fragment was then palimpsested by the Arabic hand. It is interesting that a fine copy of the Gospels of a Vetus Latina version should within a century have been palimpsested—on one side only, perhaps indicating pragmatic use—by another Latinate scribe, indicating that it was already considered of no textual value or had been damaged.

Amongst the materials that were reused to make the Arabic Gospel book were, therefore: some fragments of a large illustrated 6th-century copy of the *History of Apollonius of Tyre* (ff. 12r and 18r and v, and perhaps f. 20), probably made in Rome; fragments of Biblical texts in 6th-century Latin hands—a Vulgate Apocalypse (ff. 14r and 19v) and a Vetus Latina Gospel of St. Luke (f. 19v), written in a 6th-century Roman uncial hand which had already been overwritten in a 6th- or 7th-century Roman mixed capitalis-uncialis script also exhibiting some pre-Caroline minuscule features, akin to others found at St. Catherine's; and a number of leaves from an Insular minuscule pocket Gospel book featuring two late 8th-century Anglo-Saxon hands (ff. 15r, 15v, 18r [upper outer piece and piece along gutter], 18v, 19r, 19v, 24r, 24v, 25r [inner and outer pieces], 25v [inner and outer pieces], 26v, 27r [inner and outer pieces], 27v [inner and outer pieces]).

The interaction of the various hands indicates the need for the multiple reuse of membrane leaves and fragments prior to their ultimate palimpsesting to form the Arabic Gospels—a pattern repeated in other areas of the palimpsested materials. This would be particularly necessary if the palimpsesting took place at St. Catherine's in the Sinai Desert, where animal skins are at a premium. The pattern of interaction, along with that evident in the non-palimpsested Latin manuscripts at St. Catherine's, suggests that some of these scribes may even have been working in the monastery at Sinai.[28]

The two main periods of palimpsesting the early manuscript materials seems to have been after the 6th century, the period following the monastery's establishment by Emperor Justianian (who would presumably have furnished it with imported books and literate personnel) and the 9th century, when Greek majuscule script was being replaced by minuscule (*metacharakterismos*). The overtexts could be added within a generation or several centuries later, suggestive of a cache of discarded materials which could be plundered for writing materials, and perhaps for other domestic purposes, over a long period of time.[29] This scenario would accord with that of the sealed room in the monastery, discovered in 1975, which contained a mass of manuscript materials that were redundant or damaged and which may have been drawn upon for waste materials (like binders' waste elsewhere) for a variety of purposes, including palimpsesting to construct new books. Perhaps this practice of keeping such a cache of useful materials was of considerable antiquity at St. Catherine's.

Claudia Rapp has cautioned that it cannot be assumed that the materials now at St. Catherine's, or others which were once there and are now in other repositories, necessarily originated at the monastery or were palimpsested there.[30] In the case of the Latin palimpsest materials, they lie beneath Greek, Arabic, and Slavonic over-scripts. Greek and Arabic Christian scribes seem to have been working in the same milieu and palimpsest-

[28] See Brown, Imagining, Imaging, and Experiencing the East.
[29] See the contribution by Claudia Rapp in this volume.
[30] *Ibid.*

ing Greek, Arabic, CPA, and Latin manuscripts and fragments (Arabic also occurs over Syriac and Greek over Ethiopic). Pilgrims have travelled to the Holy Mountain in the Sinai since at least the late 4th century, when the Spanish woman (nun?) Egeria/Etheria recorded her visit, and many would have brought gifts, and still do so; this and the Crusades would probably have accounted for the presence of a considerable component of St. Catherine's collection. Rapp also points out that other places in the Levant, such as the Monastery of Mar Saba near Bethlehem and Jerusalem itself, both of which she describes as forming a cultural hinterland to St. Catherine's,[31] might also have had a tradition of palimpsesting and that there may even have been some trade in reused writing materials; certainly Giulia Rossetto has revealed evidence of Greek manuscripts from southern Italy being overwritten in the Syria-Palestine region.[32] However, 'does not have to have been undertaken at' does not mean 'was not undertaken at'. St. Catherine's *could* be the place where the cache of materials was employed for palimpsesting and it *is* where a notably high volume of these palimpsests, and non-palimpsest manuscripts in a variety of languages, some exhibiting intriguing codicological and stylistic cross-fertilization, ended up.

I would contend that St. Catherine's therefore remains the strongest contender as the meeting-place of the varied cultural elements and influences represented in a number of the early manuscripts, palimpsested and non-palimpsested, which survive there. This is supported, in the case of the Latin manuscripts, by the relationships between the non-palimpsested manuscripts at the monastery, many of which suggest interaction in a distinctive scriptorium, and by aspects of the historical context, some of which I have previously discussed.[33] Ongoing work on the Sinai Palimpsests Project and on the catalogue of the Latin manuscripts from St. Catherine's will, it is hoped, shed further light on the matter.[34]

The possible presence of at least two Insular scribes at work in Sinai at this period, or at the very least the presence there of an Insular 8th-century pocket Gospel book exhibiting eastern stylistic influence which had been palimpsested to form an Arabic Gospels within a century, whether this took place in Sinai or elsewhere in the Holy Land, supports the viability of literary accounts of journeys to the Holy Land which circulated in the Insular environment, related by travellers such as Bishop Arculf and Willibald, which have sometimes been viewed as literary *topoi*, rather like the late medieval Prester John tale. It also lends support to my contention that the material evidence for post-Roman East-West contacts[35] represents not only secondary transmission via areas such as Italy, Gaul, and Spain, but also direct and irenic contact between the peoples of the far-flung regions of Near East and far West.

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[31] Rapp, From the Holy City, 66.

[32] See Rapp in the present volume. Rossetto, *Greek Palimpsests at Saint Catherine's Monastery*, 227–260, discusses the erased texts of Sin. gr. 966.

[33] See Brown, Bridge in the Desert.

[34] Brown, *Latin Manuscripts of the Holy Monastery of St Catherine, Sinai.*

[35] Brown, Eastwardness of Things; Imaging, Imagining, and Experiencing the East.

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Grigory Kessel

A Catacomb of Syriac Texts: *Codex Arabicus* (Sin. ar. 514) Revisited

SURVEY OF SCHOLARSHIP

Margaret Dunlop Gibson, the twin sister of Agnes Smith Lewis, is known to everybody interested in Arabic Christian studies as the author of the catalogue of one of the most important collections of Christian Arabic manuscripts, preserved at St. Catherine's Monastery on Mount Sinai. The cataloguing itself took place in 1893, on the sisters' second visit to the monastery, and took about forty days.[1] The manuscripts had already been inventoried and Gibson carefully followed the available shelf marks. As with the catalogue of the Syriac manuscripts, prepared by Agnes S. Lewis, one finds in Gibson's catalogue a large number of manuscripts missing a description due to the unavailability of the manuscript at the time of cataloguing. Some of these eventually resurfaced, others did not.[2]

A few years later, Gibson herself found in the monastery one of the missing Arabic manuscripts, bearing the shelf mark '514'.[3] A brief note about this fortunate 'rediscovery' in 1902 was published in due course under the title *Four Remarkable Sinai Manuscripts*.[4] Besides indicating the circumstances of the finding of the manuscript, which turned out to be palimpsest, Gibson also provides the following results of her examination, which included the application of a reagent (ammonium hydrogen sulphide) to render the erased text temporarily legible. The overtext was written on parchment in Arabic in the early 10th century and contains the sermons of Jacob of Serugh and martyrs' lives. It is palimpsest throughout its 175 folios, containing in its *scriptio inferior* the Syriac text of the Gospel of John written in Estrangela and arranged in two columns. This Gospel manuscript should be dated to the 6th century at the latest, and may be the oldest copy of the Peshitta in existence. She identified one additional undertext in Syriac as the apocryphal *Transitus Mariae*. Finally, she notes, the Arabic manuscript is 'very much like the upper writing of a MS. which Mrs Lewis possesses, and whose under script she is about to publish as Studia Sinaitica, No. xi'.[5]

In this way, already during her initial study Margaret Gibson was able to detect a number of salient facts with regard to the manuscript that were later confirmed: the manuscript is palimpsest throughout, with erased texts in Syriac; the text of the Gospel of John is one of the most extensive undertexts and can be dated with certainty to the 6th century; and there is one further erased text in Syriac, the *Transitus Mariae* (*Dormition of the Virgin*). Furthermore, Gibson was right in connecting Sin. ar. 514 with another palimpsest, now preserved in Cambridge University Library under the shelf mark Or. 1287, which has gained considerable publicity because of the reused fragments of two very early Qurʾanic manuscripts.

Gibson's identification of the *Dormition of the Virgin* was facilitated by a favourable coincidence: Agnes Smith Lewis was engaged at the same time in the preparation of the edition of this very text, relying for the

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It is my great pleasure to thank Claudia Rapp and Michael Phelps for the invitation to participate in the Sinai Palimpsests Project, as well as to pay a visit to the Holy Monastery of St. Catherine. My gratitude for permission to use the library extends to the Fathers of the Monastery, especially its librarian, Father Justin Sinaites.

1 Gibson, *Catalogue of the Arabic MSS*, vii–viii. For a vivid account of this trip, see Soskice, *The Sisters of Sinai*, 143–173, and, with regard to the cataloguing, pp. 156–157.

2 Out of 629 manuscripts covered by the catalogue, 53 are indicated as missing (*pace* Atiya, *Arabic Manuscripts of Mount Sinai*, xxiii). Eighteen of these were reported as found in the course of the American-Egyptian expedition (Atiya, *Arabic Manuscripts of Mount Sinai*, xxiii).

3 Gibson, *Catalogue of the Arabic MSS*, 102.

4 Gibson, Four Remarkable Sinai Manuscripts, and later summarized in Lewis and Gibson, *Forty-One Facsimiles*, xvii–xviii.

5 Gibson, Four Remarkable Sinai Manuscripts, 509–510. Gibson specifies that she has managed to identify the undertext on ff. 41v, 86r, 89v, 162v and 173v.

most part on a palimpsest that she had purchased in Cairo (now Cambridge University Library, Or. 1287). Lewis examined the newly found Sinai palimpsest, but judged it not to be useful for the edition.[6] Nonetheless, later on, Lewis and Gibson showcased a page of Sin. ar. 514 as the frontispiece of their album *Forty-One Facsimiles of Dated Christian Arabic Manuscripts* in order, as they write, 'to make its existence better known'.[7]

To the best of my knowledge, no further research was devoted to the manuscript before the joint 1949–1950 American-Egyptian expedition, during which a large number of manuscripts preserved in the monastery were photographed, including Sin. ar. 514.[8] Aziz S. Atiya, an American scholar of Egyptian origin, participated in this mission and was entrusted with the task of cataloguing the Arabic manuscripts. The resulting hand-list appeared in 1955 but left much to be desired as the description was rather imprecise and sketchy.[9]

Already in the hand-list Atiya extolled the significance of Sin. ar. 514, calling it '[a] [u]nique Quintuple Palimpsest in three languages—Syriac, Greek and Arabic. Discovered on Tuesday 12 June 1950, towards the close of the Mt. Sinai Expedition, this has been christened by its discoverer and author of this Hand-list, as "Codex Arabicus"'.[10] Apparently, Atiya was intent on singling out an Arabic manuscript in order to place it alongside the *Codex Sinaiticus* and the *Syrus Sinaiticus*, the two best known of the Sinai manuscripts.[11] He also dealt with the manuscript in a number of other articles, each time limiting his remarks to some general observations.[12]

According to Atiya, the same ancient Syriac manuscript was reused four times, once for the production of another Syriac manuscript, once for a Greek manuscript, and twice more for two Arabic manuscripts. In the words of the author: '[…] the Arabicus is established as having on its archaic parchment five layers of writing—two in Syriac, one in Greek and two in Arabic. This is a record unmatched in palimpsest history. […] The top layer, which is in very good condition, was written in what may be described as early Kufic or perhaps pre-Kufic archaic Naskh […] in the late eighth or early ninth century. […] The next layer, again in Arabic, is written in even more archaic and sharply angular pre-Kufic Naskh and may safely be placed in the first Hejira century […]. Although it is difficult to determine the subject of the contents of this layer […] it would appear that this must have been a Gospel or Gospel Lectionary; in this case it could be the most ancient attempt at an Arabic rendering of any section of the Christian Scripture. The third layer is a Greek Lectionary of St. Paul's First Epistle to the Corinthians in uncials of what may be the late sixth or early seventh century. […] Beyond those three layers, two more, in Syriac, may be discerned—one relatively late and another early. It is this latter which appears to be, not only the oldest, but also the most important. It comprises portions of the Gospels of St. Matthew, St. John and especially St. Mark which has a considerable number of significant variants from the Peshitta text […] one may wonder whether the Arabicus palimpsest predates the Peshitta'.[13]

As we can see, Atiya did his best to promote the importance of the *Codex Arabicus*. In particular with regard to the Syriac undertexts, he proposed to see in the Gospel text the so-called Old Syriac version of the Gospels. The Old Syriac translation is the earliest Syriac translation of the Gospels, predating the Peshitta version and usually dated to the third century. However, as was demonstrated by Sebastian Brock (based on a single black and white reproduction of f. 42r included in Atiya's catalogue[14]), as a matter of fact the text of the Gospel of

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[6] Lewis acknowledges that she consulted the undertext of Sin. ar. 514, but decided not to include its evidence due to the fact that 'the variants are too slight to be worth recording' (Lewis, *Apocrypha Syriaca*, v).

[7] Lewis and Gibson, *Forty-One Facsimiles*, xvii.

[8] Notwithstanding Atiya's statement ('[t]he two [*i.e*. Sin. ar. 514 and Sin. ar. 588] have been vaguely known to a very narrow circle of people', in Atiya, *Arabic Manuscripts of Mount Sinai*, xxvi), I am not aware of any mention of Sin. ar. 514 in any publications besides those by Gibson and Lewis.

[9] Another limitation of the catalogue was that it covered only those manuscripts that were photographed. Atiya also prepared a more detailed description of the entire collection of Arabic manuscripts, but only half of this was published in Arabic translation, covering only the first 300 manuscripts (ʿAṭiya, *Al-Fahāris*).

[10] Atiya, *Arabic Manuscripts of Mount Sinai*, 19. The description is accompanied by four plates (II B, III, IV and V).

[11] Here explicitly: Atiya, Codex Arabicus, 75. The discovery of the ancient palimpsest made headlines in major newspapers worldwide (see, for instance, the article entitled 'Ancient Biblical Texts Found in Mount Sinai Monastery', The Washington Post, January 21, 1951, featuring a photograph of Atiya perusing a microfilm copy of the *Codex Arabicus* and reporting that '[i]f the manuscript justifies the hopes of Dr. Atiya, it will be the archeological find of the century').

[12] Atiya, The Monastery of St. Catherine; Atiya, The Arabic Treasures; Atiya, The Codex Arabicus of Mt. Sinai; Atiya, The Arabic Palimpsests; Atiya, Codex Arabicus.

[13] Atiya, Codex Arabicus, 76, 78.

[14] Atiya, *Arabic Manuscripts of Mount Sinai*, plate iii.

Matthew follows the Peshitta version.[15] Moreover, Atiya appears to have attached particular significance to the portions from the Gospel of Mark that markedly disagreed with the Peshitta, but as it turns out the undertext was simply wrongly identified, and in reality it contains the Gospel of Matthew according to the Peshitta version.[16]

Because there was no reliable description of either its *scriptio superior* or *scriptiones inferiores* apart from Atiya's rather brief and unsystematic notes, his assessment was accepted and repeated by the scholarly community. Since then, nearly every mention of the palimpsest has reiterated Atiya's captivating words about 'the unique quintuple palimpsest in three languages'.[17]

For the sake of fairness, it is worth mentioning that Julius Assfalg found one *membrum disiectum* of the *Codex Arabicus* in which he identified not only the Arabic overtexts of the fragment, but also the Syriac undertext as containing the *Dormition of the Virgin*.[18] At the time of Assfalg's cataloguing, the four-folio fragment belonged to the private collection of consul D.W. Adam in Goslar; it now forms part of the Schøyen collection in Oslo (MS 579).[19] Its Syriac undertext was later edited by Stephen Shoemaker, who highlighted the significance of the manuscript as a testimony to the text's wide circulation in Late Antiquity.[20]

Finally and most recently, Peter Tarras has published an online blog post devoted to the *Codex Arabicus*.[21] There Tarras provides a revised reading of the note containing the scribe's name—Thomas of Fusṭaṭ (Ṭōmā al-Fusṭāṭī)[22]—and presents two other manuscripts, both of monastic content, produced by the same scribe: Strasbourg, Bibliothèque nationale et universitaire, MS 4225[23], and Bryn Mawr College Library, BV 69.[24]

Gibson's study of the *scriptio inferior* was largely dependent on the application of a chemical reagent which was able to enhance the erased ink, but at the same time caused serious damage to the parchment.[25] In the course of the 20th century such a disadvantageous approach was superseded by various non-invasive methods, the most efficient being multispectral imaging.[26] Today, thanks to the collaboration between the Monastery of St. Catherine and the Sinai Palimpsests Project, we are in possession of high-resolution multispectral images which greatly facilitate the study of the palimpsest and are thereby able to assess the judgment of Atiya. Cataloguing of Sin. ar. 514 for the project was assigned to me, and the multispectral images accompanied by my

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[15] Brock, A Palimpsest Folio. Brock also identified the Syriac undertext of f. 47r (plate IV in Atiya, *Arabic Manuscripts of Mount Sinai*) as containing Col. 3:22.

[16] The mistaken identification of the Old Syriac version of the Gospel of Mark was communicated to Atiya by a renowned Biblical scholar, Paul Kahle. The archive of the Centre de Documentation et de Recherches Arabes Chrétiennes (CEDRAC) at the Université Saint-Joseph in Beirut has preserved a copy of Kahle's report relating to the Gospel undertexts dated December 26, 1950. Kahle provides the correct identification of three pages (ff. 19v, 39r, 130v) as containing the text of the Gospels of Matthew and John, but errs in his identification of f. 83r as containing the Old Syriac version of Mark 14:1–9. As a matter of fact, Kahle's mistaken identification was rectified already early on by the eminent Biblical scholar Matthew Black (who was a student of Kahle) in a letter to Aziz Atiya dated January 9, 1951 (a digital copy is available at: https://collections.lib.utah.edu/ark:/87278/s6nz91ct/779532, accessed 01.07.2023).

[17] A few random examples should suffice as illustration: Fowden, *Quṣayr ʿAmra*, 269; Kashouh, *Arabic Versions of the Gospels*, 27; Griffith, Monks of Palestine, 19; Griffith, From Aramaic to Arabic, 26; Hilali, *The Sanaa Palimpsest*, 5. Some doubts, however, have been raised in Tuerlinckx, Les palimpsestes, 193.

[18] Assfalg, *Syrische Handschriften*, 215–220.

[19] https://www.schoyencollection.com/apocryphal-literature/codex-arabicus-ms-579 (accessed 01.07.2023). The fragment formerly belonged to F. Grote (on whom see Kessel, Membra disjecta sinaitica I, 487–488 and Kessel, Membra disjecta sinaitica II, 50–51).

[20] Shoemaker, New Syriac Dormition Fragments. The remaining part of this text, as preserved in Sin. ar. 514, was edited in Brock and Kessel, "Departure of Mary".

[21] Tarras, Thomas of Fustat.

[22] Tarras claims that Atiya overlooked the scribal note, notwithstanding the fact that Atiya did in fact mention it, although not in his *Handlist* but in a later article (Atiya, Arabic Palimpsests of Mount Sinai, 118–119). Atiya's reading of the scribe's name is nevertheless incorrect: 'Ṭōmā al-Dolamāṭī' ('Thomas the Dalmatian').

[23] The only elaborate study of the manuscript is still unpublished, Mansour, *Homélies et légendes religieuses*, but see also Zaborowski, Greek Thought, Arabic Culture. A digital copy of the manuscript is available online at: https://www.numistral.fr/ark:/12148/btv1b10224668j (accessed 01.07.2023).

[24] Earlier, Michael Van Esbroeck identified the following *membra disiecta* of Bryn Mawr College, BV 69: Leiden Or. 14238, Mingana Christ. Arab. 94, Add. Arab. 130, Add. Arab. 148 and Add. Arab. 149 (van Esbroeck, Remembrement d'un manuscrit). A digital copy is available online at: http://openn.library.upenn.edu/Data/0003/html/bv_069.html (accessed 01.07.2023).

[25] One can find illustrations of the damage caused by different reagent in Albrecht, Between Boon and Bane.

[26] Albrecht, Methods.

identifications are now available at the *Sinai Palimpsests Research Site*.[27] In the course of my work on this article I have refined my description and, most importantly, identified a good number of additional texts that remained unidentified during the initial study which was undertaken in the years 2015–2016.

SCRIPTIO SUPERIOR

Manuscript Sin. ar. 514 is a collection comprised of homiletic and hagiographic works and the book of Job, most probably all translated from Greek and Syriac.[28] It consists of 176 folios: folios 1–12 measure ca. 190 × 125 mm, the remainder 230 × 150 mm.[29] The ductus varies considerably,[30] and the same is true in general for the layout: ruling is absent, the lines are not justified, and the number of lines differs from page to page.

The manuscript in its present form demonstrates various types of physical damage, including the loss of many of its leaves. As mentioned earlier, four leaves are preserved today in the Schøyen collection (MS 579). The original location of that fragment, at the end of the manuscript, is easy to discern: it starts with the martyrdom of Barsamyā, and that is where Sin. ar. 514 breaks off. As far as the *scriptio inferior* is concerned, all four folios of the fragment contain the apocryphal *Dormition of the Virgin*.

It is probable that another seven missing leaves of the *Codex Arabicus* today form Cod. arab. 1066 at the Staatsbibliothek in Munich.[31] While the texts in the *scriptio superior* were described by Georg Graf,[32] only the content of f. 2 of the *scriptio inferior* has been identified so far, as belonging to 2 Samuel 3:2–11.[33] My examination of the images, made in natural light, allowed for a number of other identifications: on f. 3v one may recognize Daniel 2:31, and the same undertext seems to be present on ff. 5 and 7; f. 6r contains 2 Samuel 3: 25–39; ff. 1 and 4 apparently have *scriptio inferior* in Arabic. The fragments from 2 Samuel and Daniel belong to the same two original Syriac manuscripts, parts of which we can find in the *Codex Arabicus* (nos. 2 and 4).[34] It is probable that a systematic examination of the fragments of Sinai manuscripts scattered around the world will bring to light additional missing leaves.[35]

Particularly regrettable is the loss of the colophon which could have informed us about the historical circumstances of the manuscript's production. Nevertheless, a scribal note appended to the book of Job contains the scribe's name, Thomas of Fustat. A number of this scribe's manuscripts have survived, and one of these is of particular importance because it has preserved information about its date of completion and place of copying. According to the colophon of Bibliothèque nationale et universitaire de Strasbourg, MS 4225, this manuscript was produced by Thomas of Fustat at Sinai in the year 288 AH, which corresponds to the period between December 900 and November 901 CE. It is thus highly likely that Thomas of Fustat also copied the *Codex Arabicus* at Sinai.

There is one more manuscript that, despite the loss of its colophon, may be attributed to the same scribe. This is the palimpsest Cambridge University Library, Or. 1287, an Arabic homiletic and hagiographic miscellany which was mentioned earlier as the manuscript purchased by Agnes Smith Lewis in Cairo.[36] Besides the very similar layout, handwriting and ductus, the two manuscripts also feature the same interlaced decorative bar, and both have an identical—albeit used by other scribes alike—formula introducing the text ('Christ is my

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[27] https://sinai.library.ucla.edu/ (accessed 01.07.2023).

[28] As of today, there is no detailed description of the manuscript, but see Atiya, *Arabic Palimpsests of Mount Sinai*, 115–119 and Atiya, Codex Arabicus. The catalogue description of Kamil is based on Atiya's study (Kamil, *Catalogue of All Manuscripts*, 42). For the book of Job see Tarras, Thomas of Fustat. A complete catalogue of the collection of Arabic manuscripts was undertaken in the years 2001–2004 under the supervision of Samir Khalil Samir, but never completed.

[29] All the catalogue descriptions indicate that the manuscript consists of 175 folios. This, however, is not correct, and arises from the fact that the second folio was erroneously foliated as '1'.

[30] This is most probably why Georg Graf distinguished three different manuscripts among the seven folios of Munich, Staatsbibliothek, Cod. arab. 1066 (Graf, Christlich-arabische Handschriftenfragmente, 125) on which see below.

[31] A digital copy is available at: https://daten.digitale-sammlungen.de/~db/0013/bsb00130949/images/ (accessed 01.07.2023).

[32] Graf, Christlich-arabische Handschriftenfragmente, 125–127. See also Assfalg, Der christliche Orient, 94–95.

[33] Peshiṭta Institute Communications, 127. The undertext received a siglum 7pk15 in the Leiden edition of the Peshitta Old Testament.

[34] Henceforth the references are made to the description of Syriac undertexts that can be found in the Appendix.

[35] As has been done, for example, in Binggeli, Les trois David.

[36] On this manuscript see: Fedeli, Mingana and the Manuscript of Mrs. Agnes Smith Lewis; Fedeli, The Digitization Project; George, Le palimpseste Lewis-Mingana.

God and my aid, Mārtmaryam is my mistress and my intercession'), as well as exhibiting several other shared scribal practices. Furthermore—as will be shown below—folios from at least two identical codices were used for the production of both Sin. ar. 514 and Cambridge, Or. 1287. The similarity of these two manuscripts was recognized earlier, but a more thorough analysis is still pending.[37]

SCRIPTIONES INFERIORES[38]

A quick glance through the list of the undertexts of the *Codex Arabicus* would suffice to recognize that this palimpsest is of an extraordinary nature. Not only is it palimpsest throughout, but many of its leaves bear three layers of writing. In total, it has been possible to identify twenty-nine different texts, of various genres—Biblical, apocryphal, hagiographical, poetic, theological, liturgical, and medicinal—present in the middle and the lowest layers. At present, it is my considered view that folios removed from nineteen independent manuscripts—eighteen in Syriac and one Greek-Arabic—were reused for the production of the *Codex Arabicus*. What is more, seven of these were already palimpsests, and are thus *bis rescripti*.

Limiting ourselves to the nineteen *codices antiquiores* that were used for the production of the *Codex Arabicus*, it is possible to determine that they range in date between the 5th/6th and the 9th centuries. Curiously, the largest number of reused manuscripts are datable to the 6th century, and the second largest group come from the 9th century. In the case of the latter group, there is a very short time span between time of production and reuse at the turn of the 10th century, constituting a period of only 50 to 100 years.[39]

The reasons that lie behind the reuse of all these manuscripts cannot be easily ascertained.[40] What can be ruled out straightaway is the incomprehensibility of a foreign language. Although we know nothing about the Arabic-speaking scribe's command of Syriac, he was clearly working in a multilingual environment in which Syriac played a prominent role. So even if he was unable to read Syriac, Syriac manuscripts must have been used and read by others in the same community. In the case of the Monastery of St. Catherine, multilingualism is well-documented.[41] Leaving this aside, we face a couple of more probable options. First of all, some manuscripts and the texts they contained could naturally have been considered obsolete and antiquated. For example, this applies to the text of Daniel in a recension that is not otherwise attested (no. 4) and that must have attracted little attention of its potential readers; the 6th-century Gospel books might not have been easy to use in the 9th century because of the development of the Gospel text itself, as well as changes in liturgical practice which resulted in complete copies of the Gospels being replaced by lectionaries (nos. 6, 7, 9); the two apocryphal texts, the *Infancy Gospel of James* and the *Dormition of the Virgin*, changed substantially in the course of these centuries (nos. 16 and 17);[42] the works of Ephrem of Nisibis were no longer appealing to readers, and were not copied in full beyond the 6th century (no. 25);[43] finally, the old copy of a herbal (no. 29) must have similarly been considered outmoded in comparison with contemporary pharmacopoeas.[44]

Secondly, manuscripts that were damaged and thereby excluded from usual circulation were especially liable to be reused. Here one further observation on the nature of the writing material can be made. Some reused manuscript parts are not bifolios, but singletons (see nos. 2, 15, 19, 21).[45] The reuse of single folios does not necessarily imply that there was a desperate lack of writing material. A reasonable assumption would be that the scribe was availing himself of a significant stockpile of parchment deriving from dismantled Syriac manu-

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37 George, Le palimpseste Lewis-Mingana, 406–416.

38 In what follows, I limit myself to the material preserved in the actual manuscript Sin. ar. 514, and hence do not take into consideration its *membra disiecta* and their *scriptiones inferiores*.

39 Schmidt in her study of the palimpsests held at the British Library observes a similar pattern (that the largest number of *codices antiquiores* belong to the 5th-7th centuries, and the shortest life span of a manuscript before its recycling is 100 to 150 years) (Schmidt, Syriac palimpsests, 166–167).

40 For some observations with regard to the Syriac palimpsests, see Schmidt, Syriac Palimpsests, 169–171. For a broader survey see Kohlbacher, Palimpseste als Geschichtsquelle.

41 For its reflection in the Arabic palimpsests, see Tuerlinckx, Les palimpsestes. See also the contribution of Claudia Rapp in this volume.

42 Desreumaux, Les apocryphes syriaques.

43 Butts, Manuscript Transmission as Reception History, 291–292.

44 For a survey of botanical and pharmaceutical literature in Syriac, see Bhayro and Hawley, La littérature botanique.

45 This is different from the widespread pattern of reuse where a bifolio of large format was intentionally cut in two and then turned by 90 or 270 degrees to form from each half a bifolio for a new manuscript.

scripts, without regard to their format, condition, or quality.

In what follows I would like to offer some provisional remarks about a few of the more prominent texts. A complete list of the texts—whether identified or not—can be found in the Appendix below.

Ephrem, *Against the Jews* (?)

The longest text (48 folios in total, no. 25) preserved in the underwriting escapes immediate identification. It is a polemic against the Jews, and deals extensively with Old Testament prophecies about Christ. Although we can be fairly sure that this text is not otherwise known, it is nevertheless possible to suggest an identification. A passage that occurs on f. 147r was quoted by the Syrian Orthodox theologian Philoxenos of Mabbug (d. 523). This quotation appears in the patristic florilegium compiled by Philoxenos as an appendix to his polemical treatise against Ḥabbib, whom he considered a Nestorian.[46] Most of the Ephremian quotations present in Philoxenos' florilegium have been identified by scholars as belonging to Ephrem's extant works.[47] A few remain unidentified, most likely because of the loss of a part of Ephrem's literary corpus.[48] Unfortunately, Philoxenos introduces the quotation under consideration without mentioning the title of his source text. Elsewhere in the florilegium, however, he quotes from an otherwise lost work of Ephrem entitled *Against the Jews*. It is known that there existed a collection of 66 *madrāšē* (hymns) with this title, of which nothing seems to have survived.[49] Whereas the attribution to Ephrem is secure, and it is tempting to go a step further and see in this extensive undertext the lost work *Against the Jews*. A more detailed analysis will be required to verify this hypothesis.[50]

Ignatius of Antioch, *Epistles to the Magnesians and the Trallians*

Two folios contain portions of the *Epistles* of Ignatius of Antioch to the Magnesians and Trallians (no. 23). The *Epistles* of Ignatius attested in the Syriac tradition belong to two recensions. The first recension, comprising three *Epistles—to Polycarp*, *to the Ephesians*, and *to the Romans*—survives in a group of three manuscripts, and since their publication by William Cureton it has been regarded as representing a short recension unknown in any other version.[51] The second recension, also known as the 'middle' recension, is the most widespread and is preserved in different versions, but is attested in Syriac only in the form of quotations and extracts.[52] Joseph B. Lightfoot (*pace* Cureton, who considered the short recension to be genuine) argues that 'we have in these fragments portions of the lost Syriac version', which he called the 'unabridged Syriac version'.[53] Comparison of the text of the *Epistles* preserved in the palimpsest allows to identify it as belonging to the middle recension, the continuous Syriac version of which has not been hitherto known.

Indeed, one of the extant Syriac extracts belonging to the middle recension corresponds exactly to the text preserved in our palimpsest: a canonical collection attested by manuscript Paris, BnF, syr. 62 as well as a number of other manuscripts[54] include an extract containing *Trall.* 2, 3.[55] On the basis of the new evidence one may now argue that the fragment found in the canonical collection was not an *ad hoc* translation, but derived from a complete translation of Ignatius' corpus, which is now attested in this palimpsest. One wonders whether the other extracts may likewise be considered as originating from this complete translation.

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[46] Edition: Brière and Graffin, *Sancti Philoxeni episcopi Mabbugensis dissertationes decem*, here p. 114, lines 10–11 (§ 227).

[47] Van Rompay, Mallpânâ dilan Suryâyâ.

[48] Graffin, Le florilège patristique.

[49] Brock, In Search of St Ephrem, 69. It is worth noting that there are a further two manuscript witnesses which may prove to contain the same text: Dayr al-Suryān, Syriac Fragment 50, and the *scriptio inferior* of the manuscript British Library, Add. 14,512.

[50] Anti-Jewish polemics occupies a prominent place in the works of Ephrem. See, for instance, the study of Shepardson, *Anti-Judaism and Christian Orthodoxy*.

[51] Cureton, *Corpus Ignatianum*, and republished later by Wright in Lightfoot, *Apostolic Fathers* II,3, 75–85.

[52] Brought together by Cureton, *Corpus Ignatianum*, 197–225, and later revised by Wright in Lightfoot, *Apostolic Fathers* II,3, 93–124.

[53] Lightfoot, *Apostolic Fathers* II,1, 104. For a current state of the art regarding the corpus of Ignatius' writings, see Vinzent, Ignatian Recensions.

[54] For the new manuscript witnesses see Batovici, Four New Syriac Witnesses.

[55] First edited in Cureton, *Corpus Ignatianum*, 198, and then later by Wright in Lightfoot, *Apostolic Fathers* II,3, 94–95.

Interestingly, whereas in the Greek manuscripts of the middle recension the *Epistles to the Magnesians* and *to the Trallians* occupy the fourth and sixth positions respectively, the Syriac text attested by the palimpsest provides a different ordering. Here, the *Epistle to the Magnesians* precedes the *Epistle to the Trallians*, and the latter is explicitly marked in the heading as the 'fifth epistle'. Precisely the same order, however, is attested by the Armenian translation produced on the basis of the Syriac *Vorlage*.[56]

An Unknown Version of Daniel

Five leaves contain a fragment from the book of Daniel (no. 4) that does not correspond completely to any of the three known Syriac versions (Peshitta, Syro-Hexapla, and the revision of Jacob of Edessa),[57] but represents an attempt to revise the standard Peshitta version against the Septuagint. Given the ample size of the extant fragment, one can rule out the possibility that it is either an *ad hoc* translation of a quotation embedded in another work or belongs to a liturgical book.

Herbal

Six folios contain an early specimen of a medicinal herbal in Syriac (no. 29). This fragment appears to belong to the earliest stage of the Syriac pharmacological tradition, and shows some similarities with other extant collections of recipes, including those preserved within the *Syriac Book of Medicines*. Moreover, the presence of Greek plant names and their Syriac equivalents offers unique evidence for the formation of Syriac botanical nomenclature.

Dated Palimpsest Fragment

Finally, it is extremely rare to find a dated colophon in a palimpsest.[58] Two, or maybe three, leaves (no. 15) contain the end of the Epistle to Hebrews (12:12–13:25), which is followed by a colophon. By its testimony, the manuscript was completed in the year 863 according to the Seleucid ('Greek') era, which corresponds to 551/2 of the Common Era. This precise date makes the palimpsest fragment the second oldest dated copy of Pauline Epistles in Syriac translation. The most ancient manuscript copy, from Dair al-Suryān and preserved today in the British Library (Add. 14,479), was copied in the year 533/4 in Edessa, and contains the corpus of Pauline Epistles. It is highly plausible that the manuscript that was reused for the *Codex Arabicus* had the same content and was perhaps even of the same origin.[59]

There are also a number of other texts witnessed to by *Codex Arabicus*. For some—such as the *Life of Sergius and Bacchus*[60] and Jacob of Serugh's *Ninth Homily on Joseph*—somewhat older manuscript copies are available,[61] but the new evidence provided by the *Codex Arabicus* may offer additional insights with regard to their transmission and what eventually led to the reuse of the manuscript copies.

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[56] Lightfoot, *Apostolic Fathers* II,1 86–91.

[57] For a survey, see Jenner, Syriac Daniel.

[58] See, for example, manuscript British Library, Add. 14,512, which contains as *scriptio inferior* the book of Isaiah copied in 459/460 CE. Cf. Tisserant, Le plus ancien manuscrit biblique daté.

[59] For a detailed study of the fragment, see Kessel, A Syriac Palimpsest Fragment.

[60] The Syriac version of the life was edited by Paul Bedjan, relying on the manuscript Berlin, Staatsbibliothek, Sachau 222 (copied in 1881 CE) as the main witness (Bedjan, *Acta martyrum et sanctorum* 3, 283–322). Given the very recent date of this manuscript, a new edition seems to be a desideratum, particularly because there are a good number of old manuscripts (the oldest, British Library, Add. 17,205 dates back, according to Wright's assessment, to the 6th century), to which we can now also add the fragment preserved in our palimpsest.

[61] Heal, Note on Jacob of Sarug's Memre on Joseph. Among the oldest manuscripts are British Library, Add. 14,584, Add. 14,604 and Vat. sir. 252, all datable to the 6th or 7th century.

CODEX ARABICUS AND THE MINGANA-LEWIS PALIMPSEST: SHARED REUSED MANUSCRIPTS

It goes without saying that in resorting to the dismantled manuscripts the ancient scribes must have reused writing material procured from the same *codices antiquiores* for a variety of new books. The extant manuscripts, few as they may be, that contain parts of the same reused *codices antiquiores* are just another indication of the high ratio of manuscript loss. That is why it is all the more remarkable to be able to establish connection between two important manuscripts, the *Codex Arabicus* and the Mingana-Lewis palimpsest (Cambridge University Library, Or. 1287). The reuse of the same codices in these two palimpsests suggests that they are likely to have been produced by the same scribe, Thomas of Fustat.[62]

The Mingana-Lewis palimpsest, just like the *Codex Arabicus*, is palimpsest throughout, produced from a large number of different manuscripts. According to the preliminary analysis carried out by Lewis, parts of roughly ten manuscripts were reused.[63]

It contains as one of its undertexts the *Infancy Gospel of James*, which was identified by Agnes Smith Lewis. In total, there are eleven folios which present the text arranged in two columns. The extant text begins at the end of chapter 9. The *Codex Arabicus* contains three leaves bearing the *Infancy Gospel of James* with identical layout and script. The beginning of the extant section in the Mingana-Lewis palimpsest (f. 92r) seamlessly matches the end of the same text in the *Codex Arabicus* (f. 49v)[64]: *ʾeṯā ʾenā <lwāṯēḵ(y)> || māryā hū nehwē lēḵ(y) mnaṭrānā*.

One further manuscript was used for the production of both the *Codex Arabicus* and the Mingana-Lewis palimpsest. As was noticed by Lewis, two folios of the latter (ff. 134 and 137) are double palimpsest: the lowest layer contains the text of Isaiah, whereas on the middle layer there is a text consisting of multiple verses from the Bible, which Lewis suggested was a homily.[65] It is highly likely that the same palimpsested manuscript was used for the production of the *Codex Arabicus*. There, f. 101 likewise carries text with verses from the Bible (no. 28), written in the same distinctive type of handwriting, with the text of Zechariah as the lowest layer (no. 5).

A proper comparison of the two manuscripts will help to ascertain if parts of other *codices antiquiores* made their way into both.[66] A joint study of these two manuscripts may also shed light on how the reused manuscripts reached the scribe. In particular, one wonders whether the dismantling took place in the same place where the new manuscripts were produced, or at another location, where the writing material arrived already prepared for reuse.[67]

THE MAKING OF THE *CODEX ARABICUS*

On the basis of analysis of the undertexts, it is possible to posit that parts of nineteen different—eighteen Syriac and one Greek-Arabic—manuscripts were reused for the production of the *Codex Arabicus*. The amount of reused writing material from each independent codex ranges from one folio to forty-eight folios. Given the variety of formats among the originals, each reused manuscript was subjected to a specific treatment which can roughly be categorized in two ways: a) a bifolio from the original manuscript was cut in two, and the resulting folio folded and turned by 90 (←) or 270 (→) degrees to become a bifolio in the new manuscript; b) the original bifolio was employed as a bifolio in the new manuscript, either turned by 180 (↑) or running in parallel (↓) with the overtext, which renders its reading very difficult. In both cases the resulting bifolio could have been additionally trimmed. In just a few cases we observe more idiosyncratic patterns of reuse: the use of a folio as a singleton (e.g. nos. 2, 15, 19 and 21) and, even more rarely, the use of a bifolio as a folio (e.g. nos. 8, 26 and 28).

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[62] My analysis of the Mingana-Lewis palimpsest relies on black and white reproductions (Lewis, *Apocrypha Syriaca*) as well as on digital images made in natural light, which are available at: https://cudl.lib.cam.ac.uk/view/MS-OR-01287 (accessed 01.07.2023).

[63] Lewis, *Apocrypha Syriaca*, ix–xxxiv.

[64] The palimpsest was used by Lewis for the edition in Lewis, *Apocrypha Syriaca*, 2*–23*. Corroborating evidence is provided by manuscript Sin. syr. NF M26N, in which the passage under consideration can be found on f. 3v.

[65] Lewis, *Apocrypha Syriaca*, xxv–xxvi.

[66] At the time of writing, multispectral images are only available for the fragments of two Qurʾans (https://cudl.lib.cam.ac.uk/view/MS-OR-01287-small/ and https://cudl.lib.cam.ac.uk/view/MS-OR-01287-LARGE/, accessed 01.07.2023).

[67] It has been argued that the palimpsestation took place at Sinai (Tuerlinckx, Les palimpsestes, 199–200).

There is a remarkable lack of consistency in the orientation of the reused folios, as different folios deriving from the same *codices antiquiores* often appear in random orientation. At the same time, palimpsest folios from the same original codex tend to be positioned close to each other in the process of reuse.

The large number of reused manuscripts, coupled with the occasional use of singletons and bifolios as a folio, strongly suggests that while working on the production of this manuscript the scribe had at his disposal a significant stockpile of parchment already prepared for reuse. We can go a step further and posit that, despite the quantity of reused writing material, each and every leaf had been deemed appropriate for reuse. This is further confirmed by the reuse of folios that carried palimpsest which had already been erased—the scribe must have been conscious of the difficulty that three layers create for the reader!

CONCLUSIONS

The manuscript Sin. ar. 514 has attracted a remarkable degree of scholarly interest but nevertheless has not ever been properly studied. Discovered by Margaret Dunlop Gibson at the Monastery of St. Catherine at the beginning of the 20th century, both its *scriptio superior* and *inferior* received very limited attention from scholars. Notwithstanding the lack of a proper study, this manuscript was elevated by Aziz Atiya to the ranks of the most important Sinai manuscripts, on a par with the Greek *Codex Sinaiticus* and the Syriac *Codex Syriacus*. According to Atiya's arguments, one and the same Syriac manuscript was reused four times in total, once for the production of another Syriac manuscript, once for a Greek manuscript, and twice more for two Arabic manuscripts; hence the codex carries five layers of writing. The fame of 'the unique quintuple palimpsest in three languages' was subsequently retained by scholarship.

The first in-depth examination of the *scriptiones inferiores* undertaken here—carried out thanks to the availability of the high-quality multispectral images produced in the context of the Sinai Palimpsests Project—allows us to give a more precise evaluation of the codex, one which in no way diminishes its value, but rather adds further facets which increase its significance.

On the one hand, it is now possible to dismiss the interpretation of the *Codex Arabicus* as being a manuscript bearing five layers of writing. Atiya treated the codex as a unity, and he attributed the traces of reuse noticeable in different parts of the manuscript cumulatively to the entire manuscript, and therefore erroneously reached the conclusion that the same manuscript had been reused four times.

On the other hand, this palimpsest is one of a kind and can undoubtedly be considered as belonging to the most important Sinai manuscripts, albeit for very different reasons to those adduced by Atiya. Among its 176 folios one can distinguish parts from nineteen originally independent manuscripts, seven of which were already palimpsests.[68] It is possible to distinguish twenty-nine different Syriac texts, one Greek, and one Arabic. Most of the texts are Biblical, but there are also fragments of apocryphal, liturgical, hagiographic, patristic, and pharmacological literature.[69] A Latin manuscript Vat. Palat. lat. 24, was once called 'a veritable mausoleum', because it contains parts from nine important Latin manuscripts.[70] In the same vein, the *Codex Arabicus* can be metaphorically compared to a catacomb with a maze of paths and bends.

The *Codex Arabicus* is not the only example of a manuscript that was produced from parts of a large number of originally independent codices. What is particularly worthy of note in this respect is that rather often such manuscripts were made at Sinai (such as the Mingana-Lewis palimpsest).[71]

The textual value of the texts identified in the underwritings of the *Codex Arabicus* that are also known in complete form still remains to be assessed, but there are four texts for which the *Codex Arabicus* is now the only extant witness. The first is a very extensive portion from the lost work of Ephrem of Nisibis, which I have tentatively proposed identifying with his work *Against the Jews*. The second is a fragment from the Syriac

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[68] Among the known Syriac palimpsests, British Library, Add. 17,136 contains parts of five reused codices (cf. Schmidt, Syriac Palimpsests, 162). This manuscript is also the only known specimen of a double palimpsest among some 68 palimpsests preserved at the British Library (Schmidt, Syriac Palimpsests, 163 with an illustration on p. 167).

[69] For the genres of the reused Syriac manuscripts, see Schmidt, Syriac Palimpsests, 170–171.

[70] Lowe, Codices rescripti, 486. On the manuscript itself see also Fohlen, Recherches.

[71] One can also mention the Arabic manuscript Ambrosian Library, L 120 sup. which is made from parts of at least 20 different manuscripts (Sirat *et al.*, Vingt manuscrits). See also a useful survey of Arabic palimpsests in Tuerlinckx, Les palimpsestes.

version of the middle recension of the *Epistles* of Ignatius of Antioch, known otherwise only in the form of excerpts. The third is a fragment from the unknown Syriac version of the Book of Daniel, which represents an attempt to revise the standard Peshitta version against the Septuagint. The fourth is a fragment from a herbal in Syriac, which appears to represent the earliest stage in the history of Syriac medicine, and documents the formation of the Syriac botanical nomenclature. Also worth mentioning is a fragment from the Epistle to the Hebrews, which contains a colophon dated 551/2 CE, making it the second oldest dated copy of the Pauline Epistles and a rare example of a reused manuscript that has preserved a date.

Besides showing the grouping of the leaves as pertaining to the same reused *codices antiquiores* and identifying a large number of the undertexts, it has been possible to point to another manuscript, the Mingana-Lewis palimpsest in Cambridge, which—as argued—was produced by the same scribe, Thomas of Fustat, making use of parts of at least two *codices antiquiores* that were also used for the production of the *Codex Arabicus*. The availability of multispectral images for the Mingana-Lewis palimpsest will enable a more thorough comparison.

This study constitutes only a first step in the exploration of the treasure trove stored within the *Codex Arabicus*. Much remains to be done. First, we need to track down its *membra disiecta*, which may be held, as is the case with other manuscript fragments of Sinaitic provenance, in various libraries and collections around the world. Second, a number of texts still await identification, and this can unquestionably be assisted by the application of more advanced methods of image processing. Third, the undertexts need to be transcribed, studied, and their textual evidence evaluated. Fourth, comparative examination of the undertexts of both the *Codex Arabicus* and the Mingana-Lewis palimpsest may help to recover additional portions of the same reused manuscripts and shed light on the origin of the Mingana-Lewis palimpsest. As a further step, one could venture into the history of the reused manuscripts, and into how and in what form they reached the scribe working at the Monastery of St. Catherine on Sinai. Last but not least, the study of the *scriptio superior* has the potential to contribute to our understanding of the manuscript output of the scribe Thomas of Fustat. Eventually, on the basis of the results of this complex research, we will have a greater understanding of the culture of palimpsests, particularly in the Middle East, but also more globally.

APPENDIX

Codices Antiquiores:

19 reused manuscripts, 7 of which are double palimpsests
(arranged in decreasing order of number of extant folios containing the erased text)

1.	Ephrem of Nisibis, *Against the Jews*	(48 ff., no. 25)
2.	Gospel of John + Gospel of Matthew	(44 ff., no. 9) + (2 ff., no. 7)
3.	Gospel of Matthew	(23 ff., no. 6)
4.	Syriac Orthodox liturgical hymns	(9 ff., no. 18)
5.	Patristic florilegium [*codex bis rescriptus*: Numbers (no. 1) and Judith (no. 3)]	(9 ff., no. 24)
6.	*Dormition of the Virgin*	(7 ff., no. 17)
7.	Herbal [*codex bis rescriptus*: Ephesians (no. 11) + 2 Thessalonians (no. 13) + 1 Timothy (no. 14)]	(6 ff., no. 29)
8.	Daniel	(5 ff., no. 4)
9.	Acts	(4 ff., no. 10)
10.	Jacob of Serugh, *Homilies on Joseph*	(3 ff., no. 26)
11.	Hebrews	(3 ff., no. 15)
12.	*Infancy Gospel of James*	(3 ff., no. 16)
13.	*Life of Sergius and Bacchus*	(2 ff., no. 22)
14.	Greek (liturgical), Arabic (unidentified) [*codex bis rescriptus*: Colossians (no. 12)]	(2 ff.)

15. Ignatius of Antioch, *Epistles* (2 ff., no. 23)
    [*codex bis rescriptus*: theological (no. 27)]
16. 1 Samuel (1 f., no. 2)
17. Rum Orthodox (Melkite) Euchologion (1 f., no. 21)
    [*codex bis rescriptus*: liturgical (no. 20)]
18. Ritual for Easter (1 f., no. 19)
    [*codex bis rescriptus*: Gospel of John (no. 8)]
19. Homily with verses from the Old Testament (1 f., no. 28)
    [*codex bis rescriptus*: Zechariah (no. 5)]

Syriac Undertexts of the *Codex Arabicus* (Arranged by Subject)[72]

Biblical

1. Numbers (Peshitta), ch. 4
Estrangela, 6th c.
2 columns, max. 16 lines
orientation: ← →
pattern of reuse: folio employed as bifolio and trimmed
the lowest text layer in a double palimpsest (for the middle layer see no. 24)

ff. 2, 6, 13–14

f. 6r: Num 4:16–17
f. 2v: Num 4:18–21
f. 2r: illegible
f. 6v: illegible
ff. 13–14: the identification is provisional because the text is almost completely illegible

2. 1 Samuel (Peshitta), ch. 31
Estrangela, 6th c.
1 column, 21 lines
orientation: ↓ ↑
pattern of reuse: folios employed as singletons (format preserved)

f. 33r: 1 Sam 31:4–8
f. 33v: 1 Sam 31:8–13

3. Judith (Peshitta), chs. 4, 7, 8, 14, 16 (Fig. 2)
Estrangela, 6th c.
2 columns, 23 lines
orientation: ↓
pattern of reuse: bifolio employed as bifolio and trimmed
the lowest text layer in a double palimpsest (for the middle layer see no. 24)

ff. 5, 9–12

f. 11r: Jdt 4:6–15
f. 10v: Jdt 7:11–18
f. 10r: Jdt 7:18–20

[72] For reasons of space, I do not provide the Syriac text.

f. 5r: Jdt 8:5–11
f. 5v: Jdt 8:11–16
f. 12v: Jdt 14:10–?
f. 9r: Jdt 16:15–23
f. 11v: illegible
f. 12r: illegible
f. 9v: illegible

4. Daniel (unknown revision of Peshitta version based on septuagint), chs. 2–3 (Fig. 6)
Estrangela, 7th c.
1 column, 27 lines
orientation: ↓ ↑
pattern of reuse: bifolio employed as bifolio

ff. 95, 97, 100, 102, 105

f. 97r: Dn 2:9–15
f. 97v: Dn 2:16–24
f. 102v: Dn 2:37–44
f. 102r: Dn 2:44–49
f. 105r: Dn 3:12–17
f. 105v: Dn 3:18–23
f. 95v: Dn 3:23–32
f. 95r: Dn 3:32–40
f. 100r: Dn 3:56–71
f. 100v: Dn 3:72–82

5. Zechariah (Peshitta), chs. 2–3 (Fig. 7)
Estrangela, 5th/6th c.
4 columns, max. 18 lines
orientation: ← →
pattern of reuse: trimmed bifolio employed as folio
the lowest text layer in a double palimpsest (for the middle layer see no. 28)

f. 101 (the full extent of the passages cannot be identified)

f. 101v: Zec 2:16–3:2
f. 101r: Zec 3:2–5

6. Gospel of Matthew (Peshitta), chs. 15–27
Estrangela, 5th/6th c.
2 columns, 21 lines
orientation: ↓ ↑
pattern of reuse: bifolio employed as bifolio and trimmed

ff. 18–19, 39–44, 46, 48, 50–51, 53–54, 56–59, 61, 80–83[73]

[73] F. 42v was skipped in the course of digitization.

f. 41r: Mt 15:33–16:3
f. 41v: Mt 16:3–12
f. 44r: Mt 16:13–21
f. 44v: Mt 16:21–27
f. 43v: Mt 16:28–17:8
f. 43r: Mt 17:9–17
f. 53v: Mt 17:17–25
f. 53r: Mt 17:25–18:6
f. 18r: Mt 18:6–12
f. 18v: Mt 18:13–20
f. 19r: Mt 18:21–29
f. 19v: Mt 18:30–19:4
f. 46v: Mt 19:5–12
f. 46r: Mt 19:14–21
f. 40v: Mt 19:21–28
f. 40r: Mt 19:28–20:7
f. 39v: Mt 20:7–16
f. 39r: Mt 20:16–23
f. 42r: Mt 20:23–31
f. 82v: Mt 21:6–14
f. 82r: Mt 21:15–21
f. 54r: Mt 21:22–27
f. 54v: Mt 21:28–34
f. 59v: Mt 21:34–43
f. 59r: Mt 21:44–22:7
f. 56v: Mt 23:34–24:1
f. 56r: Mt 24:2–8
f. 61r: Mt 24:9–19
f. 61v: Mt 24:20–29
f. 81v: Mt 24:29–37
f. 81r: Mt 24:37–46
f. 50r: Mt 24:51–25:9
f. 50v: Mt 25:10–20
f. 58v: Mt 25:20–28
f. 58r: Mt 25:28–38
f. 83v: Mt 25:38–26:2
f. 83r: Mt 26:2–13
f. 51v: Mt 26:32–41
f. 51r: Mt 26:41–51
f. 48v: Mt 26:51–59
f. 48r: Mt 26:59–68
f. 80v: Mt 27:13–21
f. 80r: Mt 27:24–32
f. 57v: Mt 27:32–44
f. 57r: Mt 27:46–54

7. Gospel of Matthew (Peshitta), chs. 3–4
Estrangela, 6th c.
2 columns, max. 13 lines
orientation: ← →
pattern of reuse: folio employed as bifolio

ff. 55 and 60

f. 55v: Mt 3:14–16 (col. a), 4:3–5 (col. b)
f. 60r: Mt 3:16–4:2 (col. a), 4:5–7 (col. b)
f. 55r: Mt 4:7–10 (col. a), 4:13–16 (col. b)
f. 60v: Mt 4:10–13 (col. a), 4:16–18 (col. b)

8. Gospel of John (Peshitta), chs. 5–6
Estrangela, 6th c.
2 columns, max. 13 lines
orientation: ← →
pattern of reuse: folio cut in two and employed as bifolio
the lowest text layer in a double palimpsest (for the middle layer see no. 19)

f. 16 (the full extent of the passages cannot be identified)

f. 16r: Jn 5:47–6:7
f. 16v: Jn 6:20

9. Gospel of John (Peshitta), chs. 1–8, 12, 17–21 (Fig. 5)
Estrangela, 6th c.
2 columns, 13 lines
orientation: ← →
pattern of reuse: folio employed as bifolio

ff. 86–94, 114–115, 120–122, 127–130, 135–146, 151–162, 167–168

f. 140r, col. a: Jn 1:25–27
f. 141v, col. a: Jn 1:27–29
f. 140r, col. b: Jn 1:29–32
f. 141v, col. b: Jn 1:32–33
f. 140v, col. a: Jn 1:33–37
f. 141r, col. a: Jn 1:37–39
f. 140v, col. b: Jn 1:39–42
f. 141r, col. b: Jn 1:42–44
f. 154r, col. a: Jn 1:44–46
f. 159v, col. a: Jn 1:46–48
f. 154r, col. b: Jn 1:48–50
f. 159v, col. b: Jn 1:51–2:1
f. 154v, col. a: Jn 2:1–5
f. 159r, col. a: Jn 2:5–8
f. 154v, col. b: Jn 2:8–10
f. 159r, col. b: Jn 2:10–11
f. 130r, col. a: Jn 2:12–14
f. 135v, col. a: Jn 2:14–16
f. 130r, col. b: Jn 2:17–19
f. 130v, col. a: Jn 2:22–24
f. 135r, col. a: Jn 2:25–3:2
f. 130v, col. b: Jn 3:2–3
f. 135r, col. b: Jn 3:3–5
f. 129r, col. a: Jn 3:5–8
f. 136v, col. a: Jn 3:8–11
f. 129r, col. b: Jn 3:11–12
f. 136v, col. b: Jn 3:13–16
f. 129v, col. a: Jn 3:16–17
f. 136r, col. a: Jn 3:18–19
f. 129v, col. b: Jn 3:19–22
f. 136r, col. b: Jn 3:22–24
f. 153r, col. a: Jn 3:25–27
f. 160v, col. a: Jn 3:27–29
f. 153r, col. b: Jn 3:29–31
f. 160v, col. b: Jn 3:31–33
f. 153v, col. a: Jn 3:33–36
f. 160r, col. a: Jn 3:36–4:2
f. 153v, col. b: Jn 4:3–5
f. 160r, col. b: Jn 4:5–7
f. 139r, col. a: Jn 4:7–9
f. 142v, col. a: Jn 4:9–10
f. 139r, col. b: Jn 4:10–12
f. 142v, col. b: Jn 4:13–14
f. 139v, col. a: Jn 4:14–16
f. 142r, col. a: Jn 4:17–20
f. 139v, col. b: Jn 4:20–22
f. 142r, col. b: Jn 4:22–23
f. 158r, col. a: Jn 5:7–10
f. 155v, col. a: Jn 5:10–12
f. 158r, col. b: Jn 5:13–14
f. 155v, col. b: Jn 5:14–17
f. 158v, col. a: Jn 5:17–18
f. 155r, col. a: Jn 5:18–19
f. 158v, col. b: Jn 5:20–22
f. 155r, col. b: Jn 5:22–24
f. 122r, col. a: Jn 5:24–26
f. 127v, col. a: Jn 5:26–29
f. 122r, col. b: Jn 5:29–30
f. 127v, col. b: Jn 5:31–34
f. 122v, col. a: Jn 5:34–36
f. 127r, col. a: Jn 5:36–39
f. 122v, col. b: Jn 5:39–43
f. 127r, col. b: Jn 5:43–45
f. 146r, col. a: Jn 5:45–6:1
f. 151v, col. a: Jn 6:1–4
f. 146r, col. b: Jn 6:5–7
f. 151v, col. b: Jn 6:7–9
f. 146v, col. a: Jn 6:9–11
f. 151r, col. a: Jn 6:11–14
f. 146v, col. b: Jn 6:14–17
f. 151r, col. b: Jn 6:17–19
f. 168r, col. a: Jn 6:19–21
f. 161v, col. a: Jn 6:22–23
f. 168r, col. b: Jn 6:23–25
f. 161v, col. b: Jn 6:26–27
f. 168v, col. a: Jn 6:27–29
f. 161r, col. a: Jn 6:30–32
f. 168v, col. b: Jn 6:32–34
f. 161r, col. b: Jn 6:35–37
f. 144r, col. a: Jn 6:37–40
f. 137v, col. a: Jn 6:40–42
f. 144r, col. b: Jn 6:42–44
f. 137v, col. b: Jn 6:45–46
f. 144v, col. a: Jn 6:47–50
f. 137r, col. a: Jn 6:51–52
f. 144v, col. b: Jn 6:52–54
f. 137r, col. b: Jn 6:54–57
f. 143r, col. a: Jn 6:57–60
f. 138v, col. a: Jn 6:60–62
f. 143r, col. b: Jn 6:62–64
f. 138v, col. b: Jn 6:65–66
f. 143v, col. a: Jn 6:66–69
f. 138r, col. a: Jn 6:70–7:1
f. 143v, col. b: Jn 7:1–4
f. 138r, col. b: Jn 7:4–7
f. 167r, col. a: Jn 7:7–10
f. 162v, col. a: Jn 7:10–12
f. 167r, col. b: Jn 7:12–15
f. 162v, col. b: Jn 7:16–17
f. 167v, col. a: Jn 7:18–20
f. 162r, col. a: Jn 7:20–22
f. 167v, col. b: Jn 7:22–25
f. 162r, col. b: Jn 7:25–27
f. 145r, col. a: Jn 7:27–28
f. 152v, col. a: Jn 7:28–31
f. 145r, col. b: Jn 7:31–33
f. 152v, col. b: Jn 7:34–35
f. 145v, col. a: Jn 7:35–37
f. 152r, col. a: Jn 7:37–39
f. 145v, col. b: Jn 7:39–41
f. 152r, col. b: Jn 7:41–44
f. 128v, col. a: Jn 7:46–50
f. 128v, col. b: Jn 8:12–13
f. 128r, col. a: Jn 8:15–17
f. 128r, col. b: Jn 8:20–21
f. 157r, col. a: Jn 8:21–23
f. 156v, col. a: Jn 8:23–26
f. 157r, col. b: Jn 8:26–28
f. 156v, col. b: Jn 8:28–30
f. 157v, col. a: Jn 8:30–33
f. 156r, col. a: Jn 8:33–35
f. 157v, col. b: Jn 8:36–38
f. 156r, col. b: Jn 8:38–40
f. 120r, col. a: Jn 12:29–31
f. 115v, col. a: Jn 12:32–34
f. 120r, col. b: Jn 12:34–36
f. 115v, col. b: Jn 12:36–38
f. 120v, col. a: Jn 12:38–41
f. 115r, col. a: Jn 12:41–44
f. 120v, col. b: Jn 12:44–47
f. 115r, col. b: Jn 12:48–50
f. 121r, col. a: Jn 17:20–22

f. 114v, col. a: Jn 17:22–24
f. 121r, col. b: Jn 17:24–26
f. 114v, col. b: Jn 18:1–2
f. 121v, col. a: Jn 18:2–4
f. 114r, col. a: Jn 18:4–6
f. 121v, col. b: Jn 18:6–9
f. 114r, col. b: Jn 18:9–11
f. 90r, col. a: Jn 19:18–20
f. 89v, col. a: Jn 19:20–22
f. 90r, col. b: Jn 19:22–24
f. 89v, col. b: Jn 19:24–25
f. 90v, col. a: Jn 19:25–28
f. 89r, col. a: Jn 19:28–30
f. 90v, col. b: Jn 19:30–31
f. 89r, col. b: Jn 19:32–34
f. 86r, col. a: Jn 19:34–37
f. 93v, col. a: Jn 19:38
f. 86r, col. b: Jn 19:38–40
f. 93v, col. b: Jn 19:41–42
f. 86v, col. a: Jn 20:1–2
f. 93r, col. a: Jn 20:2–5
f. 86v, col. b: Jn 20:5–8
f. 93r, col. b: Jn 20:8–11
f. 87r, col. a: Jn 20:12–14
f. 92v, col. a: Jn 20:14–15
f. 87r, col. b: Jn 20:15–17
f. 92v, col. b: Jn 20:17–19
f. 87v, col. a: Jn 20:19–21
f. 92r, col. a: Jn 20:21–24
f. 87v, col. b: Jn 20:24–25
f. 92r, col. b: Jn 20:26–27
f. 91r, col. a: Jn 20:27–30
f. 88v, col. a: Jn 20:30–21:1
f. 91r, col. b: Jn 21:1–3
f. 88v, col. b: Jn 21:3–5
f. 91v, col. a: Jn 21:5–7
f. 88r, col. a: Jn 21:7
f. 91v, col. b: Jn 21:8–10
f. 88r, col. b: Jn 21:10–11
f. 94r, col. a: Jn 21:11–14
f. 94r, col. b: Jn 21:16–17
f. 94v, col. a: Jn 21:18–19
f. 94v, col. b: Jn 21:21–23
f. 135v, col. b: Jn 22:20–22

10. Acts (Peshitta), chs. 7, 9 and 10
Estrangela, 6th c.
1 column, 23–24 lines
orientation: ↓ ↑
pattern of reuse: bifolio employed as bifolio

ff. 32, 34–36

f. 35v: Acts 7:25–32
f. 35r: Acts 7:32–37
f. 32r: Acts 7:50–56
f. 32v: Acts 7:56–8:2
f. 36r: Acts 9:14–21
f. 36v: Acts 9:21–26
f. 34v: Acts 9:39–10:1
f. 34r: Acts 10:1–7

11. Ephesians (Peshitta), chs. 2 and 3
Estrangela, 6th c.
2 columns, max. 15 lines
orientation: ← →
pattern of reuse: folio employed as bifolio and trimmed
the lowest text layer in a double palimpsest (for the middle layer see no. 29)

ff. 1a and 8 (the full extent of the passages cannot be identified)

f. 1av: Eph 2:10–12 (col. a), 2:15–19 (col. b)
f. 8r: Eph 2:12
f. 8v: Eph 3:5–6
f. 1ar: Eph 3:10–11

12. Colossians (Peshitta), chs. 3 and 4
Estrangela, 6th c.
2 columns, max. 14 lines
orientation: ← →
pattern of reuse: folio employed as bifolio
the lowest text layer in a double palimpsest (the middle layer bears Greek script on one side and Arabic on the other)

ff. 47 and 52 (the full extent of the passages cannot be identified)
f. 47v: contains Col 3:8
f. 52r: contains Col 3:9–10
f. 47r: contains Col 3:22
f. 52v: contains Col 4:6

13. 2 Thessalonians (Peshitta), ch. 3
Estrangela, 6th c.
2 columns, max. 15 lines
orientation: ←
pattern of reuse: folio employed as bifolio and trimmed
the lowest text layer in a double palimpsest (for the middle layer see no. 29)

ff. 1br and 7v (the full extent of the passages cannot be identified)

f. 7v: 2 Thes 3:7–8
f. 1br: 2 Thes 3:17

14. 1 Timothy (Peshitta), chs. 1, 4–5 (Fig. 1)
Estrangela, 6th c.
2 columns, max. 15 lines
orientation: ← →
pattern of reuse: folio employed as bifolio and trimmed
the lowest text layer in a double palimpsest (for the middle layer see no. 29)

ff. 1bv, 3–4, 7r

f. 7r: 1 Tim 1:1–3 (col. a), 1:7–9 (col. b)
f. 1bv: 1 Tim 1:3–6 (col. a), 1:9–12 (col. b)
f. 3r: 1 Tim 4:14–5:2
f. 3v: 1 Tim 5:17–19
f. 4v: 1 Tim 5:2–5 (col. a), 5:8–11 (col. b)
f. 4r: 1 Tim 5:23; the full extent of the passage cannot be identified.

15. Hebrews (Peshitta), chs. 12–13[74]
Estrangela, dated Anno Graecorum 863 [= 551/2 CE]
2 columns, 33 lines
orientation: ↓
pattern of reuse: folio employed as singleton

ff. 37–38 and 45

[74] For a study of the fragment, see Kessel, A Syriac Palimpsest Fragment.

f. 38r: Heb 12:12–27
f. 38v: Heb 12:27–13:15
f. 45r: Heb 13:16–25
f. 45v: colophon
f. 37: almost completely illegible

Apocrypha

16. Infancy Gospel of James (Protoevangelium Iacobi), chs. 1–9
CANT 50
Estrangela, 5th/6th c.
2 columns, 24 lines
orientation: ↓ ↑
pattern of reuse: bifolio employed as bifolio and trimmed

ff. 15, 22, 49

f. 22v: chs. 1–3 (~ ed. Lewis, *Apocrypha Syriaca*, 3*, line 3 – 4*, line 3)
f. 22r: chs. 3–4 (~ ed. Lewis, *Apocrypha Syriaca*, 4*, lines 3–10)
f. 15v: ch. 4 (~ ed. Lewis, *Apocrypha Syriaca*, 4*, line 10 – 5*, line 3)
f. 15r: chs. 4–6 (~ ed. Lewis, *Apocrypha Syriaca*, 5*, lines 3–18)[75]
f. 49r: chs. 8–9 (~ ed. Lewis, *Apocrypha Syriaca*, 7*, lines 3–ult.)
f. 49v: ch. 9 (~ ed. Lewis, *Apocrypha Syriaca*, 7* ult. – 8*, line 12)

17. Dormition of the Virgin (Libri VI de dormitione B. V. Mariae), Book 2[76] (Fig. 8)
CANT 123–124
Estrangela, 6th c.
2 columns, max. 15 lines
orientation: ← →
pattern of reuse: folio employed as bifolio

ff. 169–175

f. 174r: ed. Lewis, *Apocrypha Syriaca*, 39*, col. 2, line 25 – 40*, col. 1, line 6 (col. a); 40*, col. 1, line 23 – col. 2, line 8 (col. b)
f. 171v: ed. Lewis, *Apocrypha Syriaca*, 40*, col. 1, lines 6–18 (col. a); 40*, col. 2, lines 9–20 (col. b)
f. 174v: ed. Lewis, *Apocrypha Syriaca*, 40*, col. 2, line 21 – 41*, col. 1, line 6 (col. a); 41*, col. 1, lines 9–23 (col. b)
f. 171r: ed. Lewis, *Apocrypha Syriaca*, 41*, col. 1, lines 6–9 (col. a); 41*, col. 1, line 23 – col. 2, line 12 (col. b)
f. 169v: ed. Lewis, *Apocrypha Syriaca*, 42*, col. 1 l. 1–17 (col. a); 42* col. 2 l. 9–22 (col. b)
f. 169r: ed. Lewis, *Apocrypha Syriaca*, 43*, l. 4–12 (col. a); 43* l. 17 – 44* l. 1 (col. b)
f. 175r: ed. Lewis, *Apocrypha Syriaca*, 44*, lines 2–5 (col. a); 44*, lines 12–18 (col. b)
f. 170v: ed. Lewis, *Apocrypha Syriaca*, 44*, lines 6–12 (col. a); 44*, lines 18 – 45*, col. 1, line 8 (col. b)
f. 175v: ed. Lewis, *Apocrypha Syriaca*, 45*, col. 1, line 9 – col. 2, line 1 (col. a); 45*, col. 2, line 19 – 46*, col. 1, line 11 (col. b)
f. 170r: ed. Lewis, *Apocrypha Syriaca*, 45*, col. 2, lines 2–19 (col. a); 46*, col. 1, line 11 – col. 2, line 3 (col. b)
f. 173r: ed. Lewis, *Apocrypha Syriaca*, 46*, col. 2, lines 3–19 (col. a); 47*, col. 1, lines 8–24 (col. b)

[75] Lewis' edition is eclectic and the text missing in the palimpsest was supplied based on a much later manuscript that attests to a different text form. Hence the impossibility of establishing the precise relationship between the manuscript and edition.

[76] There is no critical edition of the text. For an identification and edition of the palimpsest fragment see Brock and Kessel, "Departure of Mary".

f. 172v: ed. Lewis, *Apocrypha Syriaca*, 46*, col. 2, line 19 – 47*, col. 1, line 8 (col. a); 47*, col. 2, lines 1–17 (col. b)
f. 173v: ed. Lewis, *Apocrypha Syriaca*, 47*, col. 2, line 18 – 48*, col. 1, line 11 (col. a); 48*, col. 1, line 21 – col. 2, line 13 (col. b)
f. 172r: ed. Lewis, *Apocrypha Syriaca*, 48*, col. 1, lines 12–21 + 49*, col. 1, lines 2–7 (col. a); 48*, col. 2, line 13 – 49*, col. 1, line 2 (col. b)

Liturgical

18. Syriac Orthodox liturgical hymns (maʿnīthā)

Estrangela, 8th c.
1 column, 25 lines
orientation: ↓ ↑
pattern of reuse: bifolio employed as bifolio
The index contains the commemoration of Pentecost, locusts (?), St. George, and for the deceased.

ff. 23–31

f. 29v: index, with numbers 20 to 28 (some items appear to be omitted)
f. 29r: index with numbers 33 to 53 (a few items seem to be omitted)
f. 28v: end of the index, with numbers 56 to 63

19. Ritual for Easter (?)

Medial Estrangela, 8th/9th c.
1 column, 25 lines
orientation: ↑
pattern of reuse: folio employed as singleton (trimmed)
the middle text layer in a double palimpsest (for the lowest layer see no. 8)

f. 16

20. (Unidentified) Liturgical text

Estrangela, 7th/8th c.
1 column, the number of lines is impossible to discern as only a few lines are visible
orientation: ↓
pattern of reuse: trimmed folio
the lowest text layer in a double palimpsest (for the middle layer see no. 21)

f. 21

21. Rum Orthodox (Melkite) Euchologion (?)

Late Estrangela (Melkite), 9th c.
1 column, 24 lines
orientation: ↑
pattern of reuse: folio employed as singleton (trimmed)
the middle text layer in a double palimpsest (for the lowest layer see no. 20)

f. 21

Hagiography

22. Life of Sergius and Bacchus (*BHO* 1052)
Estrangela, 5th c.
1 column, 21 lines
orientation: ↑
pattern of reuse: bifolio employed as bifolio

ff. 103 and 104

f. 104v: ed. Bedjan, *Acta martyrum et sanctorum* 3, 294, line 16 – 295, line 10
f. 104r: ed. Bedjan, *Acta martyrum et sanctorum* 3, 295, line 10 – 296, line 3
f. 103r: ed. Bedjan, *Acta martyrum et sanctorum* 3, 300, line 14 – 301, line 7
f. 103v: ed. Bedjan, *Acta martyrum et sanctorum* 3, 300, line 3 – 300, line 14

Patristic

23. Ignatius of Antioch, Epistles to the Magnesians, chs. 12–15, Epistle to the Trallians, chs. 1–3 (*CPG* 1025) (Fig. 3)
Serto, 9th c.
1 column, 23 lines
orientation: ↓
pattern of reuse: bifolio employed as bifolio
the middle text layer in a double palimpsest (for the lowest layer see no. 27)

ff. 17 and 20

f. 17r: *Ig.Magn.* 12–14 (ed. Lightfoot, *Apostolic Fathers* II,2, 136, line 5 – 139, line 4)
f. 17v: *Ig.Magn.* 14–15 (ed. Lightfoot, *Apostolic Fathers* II,2, 139, line 4 – 140, line 5)
Ig.Trall. (ed. Lightfoot, *Apostolic Fathers* II,2, 150, line 1 – 152, line 3), entitled 'fifth epistle'
f. 20r: *Ig.Trall.* 1–2 (ed. Lightfoot, *Apostolic Fathers* II,2, 152, line 3 – 155, line 7)
f. 20v: *Ig.Trall.* 2–3 (ed. Lightfoot, *Apostolic Fathers* II,2, 155, line 7 ~ 160, line 4)

24. Patristic florilegium (Fig. 2)
Estrangela, 9th c.
1 column, 23–25 lines
orientation: ↓ ↑
pattern of reuse: bifolio employed as bifolio
the middle text layer of a double palimpsest (for the lowest layer see nos. 1 and 3)

ff. 2, 5–6, 9–14

f. 5r: the extract is attributed in the heading to John Chrysostom and deals with John the Baptist (? *CPG* 4424)
f. 5v: the first extract is preceded by a heading containing the name of Epiphanius of Cyprus; the second extract, attributed to Mar Aba, disciple of Mar Ephrem, begins with the words 'chapter that demonstrates' and indicates that it deals with John the Baptist
f. 9r: the extract is attributed in the heading to John Chrysostom and deals with the parable of the prodigal son (*CPG* 4577)
f. 9v: heading: 'of the same <John Chrysostom>, from the second homily on the same subject' (*CPG* 4577)
f. 10v: the extract is attributed to Methodius <of Olympus> and is preceded by a heading that begins with the words 'chapter that demonstrates' and indicates that it deals with Moses and Elijah who appeared to Christ (*CPG* 1812)
f. 12v: the extract is attributed to Athanasius <of Alexandria> and is preceded by a heading that begins with

the words ‘chapter that demonstrates’ and indicates that it deals with the blasphemy against the Holy Spirit (*CPG* 1812)

25. Ephrem of Nisibis, Against the Jews (?) (Fig. 4)
Estrangela, 6th/7th c.
2 columns, max. 15 lines
orientation: ← →
pattern of reuse: folio employed as bifolio

ff. 62–79, 84–85, 106–113, 116–119, 123–126, 131–134, 147–150, 163–166

26. Jacob of Serugh, Ninth Homily on Joseph
Estrangela, 8th/9th c.
1 column, max. 24 lines
orientation: ← →
pattern of reuse: bifolio employed as folio

ff. 96, 98–99

f. 96r, recto: ed. Akhrass and Syryany, *160 Unpublished Homilies* 1, 555, lines 103–?
f. 96v, verso: ed. Akhrass and Syryany, *160 Unpublished Homilies* 1, 555, line 111 – 556, line 119
f. 98r, recto: ed. Akhrass and Syryany, *160 Unpublished Homilies* 1, 556, lines 121–129
f. 98v, verso: ed. Akhrass and Syryany, *160 Unpublished Homilies* 1, 556, lines 131–140
f. 99v, recto: ed. Akhrass and Syryany, *160 Unpublished Homilies* 1, 557, line 162 – 558, line 173
f. 99r, verso: ed. Akhrass and Syryany, *160 Unpublished Homilies* 1, 558, lines 175–186
f. 99r, recto: ed. Akhrass and Syryany, *160 Unpublished Homilies* 1, 560, lines 233–241
f. 99v, verso: ed. Akhrass and Syryany, *160 Unpublished Homilies* 1, 560, lines 243–251
f. 98v, recto: ed. Akhrass and Syryany, *160 Unpublished Homilies* 1, 561, lines 272–280
f. 98r, verso: ed. Akhrass and Syryany, *160 Unpublished Homilies* 1, 561, line 282 – 562, line 291
f. 96v, recto: ed. Akhrass and Syryany, *160 Unpublished Homilies* 1, 562, lines 291–299
f. 96r, verso: ed. Akhrass and Syryany, *160 Unpublished Homilies* 1, 562, lines 300–308

27. (Unidentified) theological text (Fig. 3)
Estrangela, 5th c.
1 column, the number of lines is impossible to discern as only a few lines are visible
orientation: ↓
pattern of reuse: bifolio employed as bifolio
the lowest text layer in a double palimpsest (for the middle layer see no. 23)

ff. 17 and 20

28. Homily with verses from the Old Testament (Fig. 7)
Estrangela and Serto, 9th c.
1 column, max. 16 lines
orientation: ← →
pattern of reuse: trimmed bifolio employed as folio
the middle text layer of a double palimpsest (for the lowest layer see no. 5)

f. 101

f. 101r: Jer 50:23, Is 41:14
f. 101v: Gen 1:1–2,3

Medicinal recipes

29. Herbal (Fig. 1)
Medial Estrangela, 8th/9th c.
1 column, 22–26 lines
orientation: ↓ ↑
pattern of reuse: bifolio employed as bifolio
the middle text layer of a double palimpsest (for the lowest layer see nos. 11, 13 and 14)

ff. 1a–1b, 3–4, 7–8

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Fig. 1: Sin. ar. 514, f. 3r, double palimpsest. Middle layer (parallel to overtext): Herbal. Lowest layer (at 270° to overtext): 1 Tim. 4:14 – 5:2 (© St. Catherine's Monastery, Sinai, Egypt)

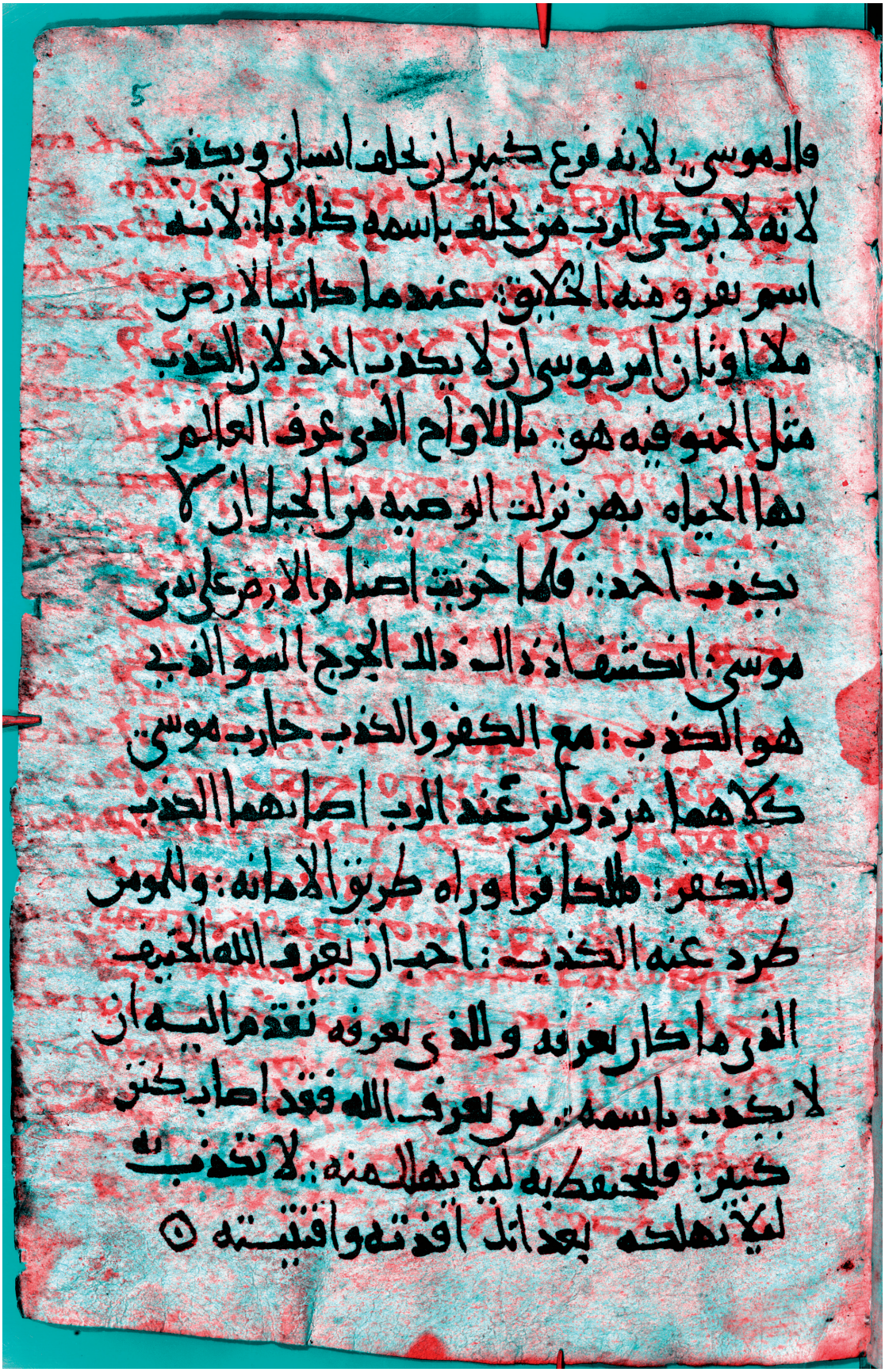

Fig. 2: Sin. ar. 514, f. 5r, double palimpsest. Middle layer (at 180° to overtext): patristic florilegium (features an extract attributed in the heading to John Chrysostom). Lowest layer (parallel to overtext): Judith 8:5–11 (© St. Catherine's Monastery, Sinai, Egypt)

Fig. 3: Sin. ar. 514, f. 17v, double palimpsest. Middle layer (parallel to overtext): Ignatius of Antioch, *Ig.Magn.* 14–15, and beginning of *Ig.Trall.*, entitled ‘fifth epistle’. Lowest layer (parallel to overtext): unidentified theological text (© St. Catherine’s Monastery, Sinai, Egypt)

Fig. 4: Sin. ar. 514, f. 64r, Ephrem of Nisibis, *Against the Jews* (?) (© St. Catherine's Monastery, Sinai, Egypt)

Fig. 5: Sin. ar. 514, f. 86r, col. a: John 19:34–37, col. b: John 19:38–40 (© St. Catherine's Monastery, Sinai, Egypt)

Fig. 6: Sin. ar. 514, f. 95v, Daniel 3:23–32 (unknown revision based on Septuagint)
(© St. Catherine's Monastery, Sinai, Egypt)

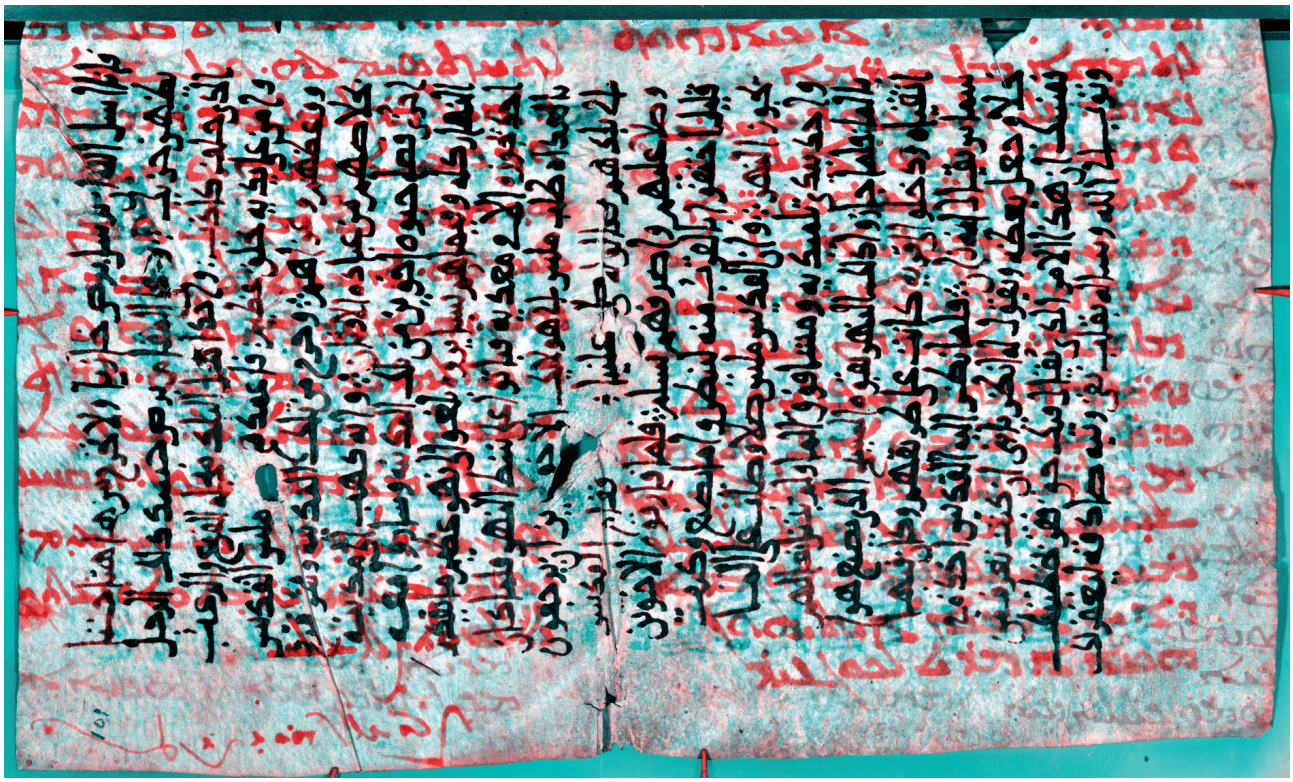

Fig. 7: Sin. ar. 514, f. 101r, double palimpsest. Middle layer (at 90° to overtext): Homily with verses from the Old Testament (contains Jer. 50:23, Isa. 41:14). Lowest layer (at 90° to overtext): Zechariah 3:2–5 (© St. Catherine's Monastery, Sinai, Egypt)

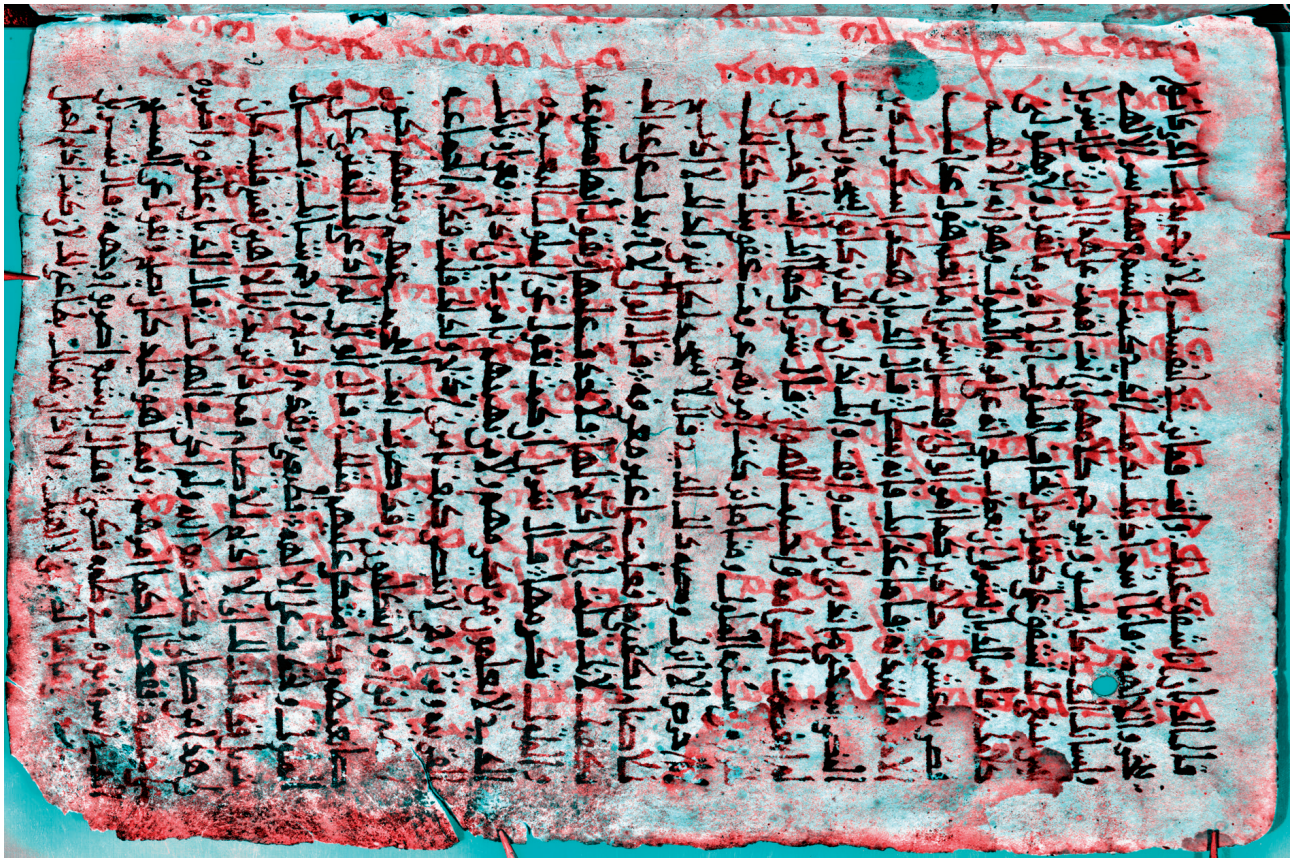

Fig. 8: Sin. ar. 514, f. 170v, *Dormition of the Virgin* (© St. Catherine's Monastery, Sinai, Egypt)

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Le palimpseste Sin. syr. NF M56N du nouveau fonds de Sainte-Catherine : son apport à la codicologie araméenne christo-palestinienne, aux versions anciennes des textes bibliques et à l'histoire de la liturgie

Abstract: The technique used to reveal palimpsest texts of the Library of St. Catherine's Monastery at Mount Sinai has succeeded in the discovery of Christo-Palestinian Aramaic texts from the most ancient witnesses of this literature, possibly from the 6th century AD. Manuscript Sin. syr. NF M56N (CPA), consisting of 114 folios, is particularly remarkable. This manuscript reveals a great deal of codicological information. It reused 45 folios of an ancient Christian Palestinian Aramaic codex which can be reconstructed with great precision. Quires are quaternions, with the fleshside outside with 'en miroir' signatures. The layout is regular: two columns of 23 lines; system of ruling and pricking; decoration is used: big crosses inscribed in circles as drop caps mark the beginning of pericopes; the initials for many sentences are coloured and ornamented; calligraphy is beautifully realised; punctuation is regular. Moreover, this manuscript is a precious witness for two New Testament texts translated from Greek into Christian Palestinian Aramaic. Extensive passages are legible, some of which had been previously unknown in this language. The codex was a Gospel book containing Matthew and Mark. A critical edition is in progress. Already at this point, it seems clear that the text is a good representative of what I have called 'the Christo-Palestinian Vulgata' that was in use among Chalcedonian Christians of Palestine and Arabia as early as the 6th century. One can note also the presence of a system of synoptical references in the margins. Moreover, each Gospel text includes subtitles with numbering.

S'il est bien connu que le vaste trésor multilingue de la bibliothèque du monastère Sainte-Catherine du Sinaï comprend un fonds important de manuscrits syriaques dont beaucoup sont très anciens, il est moins connu qu'il contient aussi un certain nombre – certes bien moins nombreux – de manuscrits dans une langue très proche qui en fut trop souvent considérée comme une variante dialectale, l'araméen christo-palestinien. Or, bien qu'on trouve ses textes écrits dans une graphie proche de l'estrangela syriaque, l'araméen christo-palestinien n'est pas une variante du syriaque : il est une forme d'araméen occidental[1] qui a sa grammaire propre[2] et des mots et expressions inconnus en syriaque. Les premières éditions relatives à ces textes remontent au milieu du XVIIIe siècle avec les Assemani[3] qui mettent en évidence un évangéliaire (conservé au Vatican)[4] écrit, selon eux, en « syriaque palestinien » et daté de 1030 AD. C'est ainsi que la première découverte moderne savante de l'existence de documents araméens christo-palestiniens concerne la lecture du Nouveau Testament dans la liturgie araméenne melkite de Jérusalem conservée à Sainte-Catherine du Sinaï. En effet, à la suite de Jacob Adler[5] et de Paul de Lagarde[6] qui rattachent cet évangéliaire à Jérusalem, les deux pionnières des études sinaïtiques en syriaque et en christo-palestinien, les sœurs Agnes Smith Lewis et Margaret Dunlop Gibson en font une édition critique avec deux évangéliaires semblables qu'on leur a montrés dans la bibliothèque de

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1 Voir Müller-Kessler, review of A. Desreumaux, *Codex sinaiticus Zosimi rescriptus*.

2 Voir Schulthess, *Grammatik des christlich-palästinischen Aramäisch* et Müller-Kessler, *Grammatik des Christlich-Palästinisch-Aramäischen*.

3 Assemani, *Bibliothecae Apostolicae Vaticanae … catalogus*, 70–103.

4 Ms. Vat. sir. 19.

5 Adler, *Novi Testamenti Versiones*.

6 Lagarde, *Evangeliarum Hierosolymitanum*. Notons que Lagarde, Das aramäische Evangeliar des Vatican, nomme explicitement le ms. du Vatican « L'évangéliaire araméen ».

Sainte-Catherine. Ces manuscrits sont datés du XII^e siècle.[7] Déjà, Lewis et Gibson relèvent que les divisions de ses lectures s'accordent avec celles du lectionnaire arabe alors en usage chez les melkites, « à quelques petites variantes près ».[8] Il faut noter que, déjà en 1897, les sœurs Lewis et Gibson avaient publié un lectionnaire christo-palestinien pour les lectures liturgiques de l'Ancien Testament, des Actes et des Épîtres,[9] qu'elles avaient acquis au Caire comme venant d'un village libanais et qu'elles soupçonnaient provenir de Sainte-Catherine ; en tout cas, elles en attribuent sans hésitation l'usage à « la branche melkite de l'Église syrienne »[10] selon une expression qu'il faut évidemment aujourd'hui repréciser.

Comme on le remarquera plus loin, l'apport de ces lectionnaires à l'histoire de la liturgie de Jérusalem n'a vraiment été pris en considération que récemment[11] et doit encore faire l'objet d'une recherche détaillée, d'autant plus que les découvertes du nouveau fonds de Sainte-Catherine ont apporté encore deux autres évangéliaires, également de la période médiévale.[12]

LES MANUSCRITS CHRISTO-PALESTINIENS DE L'ANCIEN FONDS

Avant l'édition des évangéliaires médiévaux A, B et C en 1899, des publications de folios et de manuscrits mutilés avaient fait connaître, dans la deuxième moitié du XIX^e siècle, des manuscrits christo-palestiniens se trouvant à Sainte-Catherine[13] ou en provenant ou trouvés en Égypte et au Levant et contenant des textes de l'Ancien et du Nouveau Testament, des textes hagiographiques et des homélies.[14] Beaucoup de folios sont palimpsestes et remontent à une période plus ancienne que les lectionnaires médiévaux, en tout cas antérieure au X^e siècle, à en juger par leur réutilisation. À la différence des lectionnaires médiévaux dont l'écriture est « la cursive christo-palestinienne normalisée »,[15] leur écriture est celle de « l'onciale » bâtie sur l'estrangela.[16] On n'a malheureusement trouvé jusqu'à présent aucun ancien manuscrit araméen christo-palestinien précisément daté, d'abord à cause du caractère fragmentaire de ceux-ci, et peut-être parce qu'à la différence des manuscrits syriaques, ils ne portaient pas de colophons datés. L'évaluation des datations des manuscrits de la période ancienne (VI^e–X^e siècle) ne peut guère s'appuyer que sur des appréciations paléographiques incertaines. Les inscriptions découvertes sur les sites archéologiques des Palestines et de l'Arabie byzantine (aujourd'hui en Palestine, en Israël, en Jordanie et au Sud de la Syrie) fournissent quelques indices grâce aux rares inscriptions datées et aux contextes archéologiques. Les vestiges épigraphiques (certaines inscriptions sur

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[7] Selon Lewis and Gibson, *The Palestinian Syriac Lectionary*, qui en font une description p. xii–xiii, ils sont datés respectivement de 1104 AD pour le codex B (cote : Sin. CPA 1, Lewis, *Catalogue of the Syriac Mss*, 93) et 1118 AD pour le codex C (cote : Sin. CPA 2, Lewis, *Catalogue of the Syriac Mss*, 93) et comportent tous deux 156 folios alors que, dans le catalogue de 1894, ils sont datés respectivement de 1094 AD et 1098 AD et comportent respectivement 150 et 143 folios. Dans l'édition critique elle-même, les derniers folios indiqués dans les textes de B et de C sont respectivement les f. 151 et 154. Les dates de 1104 et 1118 AD correspondent aux dates données par les colophons (6612 et 6626 Adam, selon le comput dit de l'ère byzantine ultérieure).

[8] Lewis & Gibson, *The Palestinian Syriac Lectionary*, x.

[9] Lewis & Gibson, *A Palestinian Syriac Lectionary*.

[10] Lewis & Gibson, *A Palestinian Syriac Lectionary*, vii.

[11] Voir Verhelst, *Le lectionnaire de Jérusalem*, 23.

[12] Mss Sin. syr. NF M41N et M42N ; voir Desreumaux dans Philothée, *Nouveaux manuscrits syriaques*, 440–448 et 449–463 ; je les ai nommés E et F, à la suite des évangéliaires A, B, C et D édités par Lewis & Gibson, *The Palestinian Syriac Lectionary* ; ils sont fragmentaires et non datés, mais par leur écriture et leur organisation, ils appartiennent à la même liturgie.

[13] Le ms. Sin. CPA 3, 14 folios du XI^e siècle trouvés dans une reliure d'un livre arabe (Lewis, *Catalogue of the Syriac Mss*, 93 et 118–120) ; 2 folios à la fin du ms. Sin. syr. 8 (Lewis, *Catalogue of the Syriac Mss*, 3) ; 1 folio dans la reliure du Sin. syr. 15 (Lewis, *Catalogue of the Syriac Mss*, 17–18) ; les 4 folios du fragment Sin. syr. 6 (Lewis, *Catalogue of the Syriac Mss*, 98–102) ; les 2 folios du fragment 54 (Lewis, *Catalogue of the Syriac Mss*, 118–120), dans la reliure du codex Sin. géo. 32 ; les 2 folios du fragment 55 (Lewis, *Catalogue of the Syriac Mss*, 120–123) dans la reliure du ms. Sin. syr. 8.

[14] Voir le résumé et les références dans Lewis & Gibson, *The Palestinian Syriac Lectionary*, x–xi.

[15] J'avais jusqu'à présent adopté une position sans doute trop simpliste sur la graphie araméenne christo-palestinienne (Desreumaux, *Codex sinaiticus Zosimi rescriptus*, Desreumaux, Introduction à l'histoire) selon laquelle il existait une écriture de la période « ancienne » – du V^e au IX^e–X^e siècle, une « onciale » bâtie sur l'estrangela syriaque – et l'écriture de la période médiévale – du XI^e au XIII^e siècle, une cursive dont la graphie s'expliquait par l'évolution paléographique de l'écriture ancienne. Suite à l'examen des inscriptions christo-palestiniennes de Palestine et de Jordanie (Ḫirbat Mird, Samra, Ḥayyan al-Mušrif), je considère désormais que des formes cursives existaient déjà à la période ancienne et que l'écriture des manuscrits médiévaux a été créée à partir de celles-ci et fixée, comme une police de caractères typographiques peut être créée à partir de formes cursives ; on peut l'appeler la « cursive christo-palestinienne normalisée ».

[16] A. Smith Lewis décrivant le *Codex Climaci rescriptus II :* « the script is of an archaic character » (Lewis, *Codex Climaci Rescriptus*, xv).

mosaïques d'églises, d'autres gravées sur pierre, quelques-unes sur tessons) montrent que l'écriture des manuscrits christo-palestiniens que l'on peut appeler « anciens » remonte à une période postérieure au Ve siècle.[17]

L'ancien fonds de la bibliothèque de Sainte-Catherine comprend ainsi une petite collection de manuscrits araméens christo-palestiniens depuis les plus anciens vestiges de cette littérature, peut-être du VIe–VIIe siècle jusqu'à l'époque médiévale. Pour la connaissance de la littérature christo-palestinienne, il faut y ajouter les manuscrits se trouvant dans les diverses autres bibliothèques, Londres, Cambridge, Oxford, Birmingham, Berlin, Göttingen, Vatican, Saint-Pétersbourg, Jérusalem, Philadelphie, dont beaucoup proviennent de Sainte-Catherine et quelques-uns de la Genizah du Vieux-Caire, de la Qubbat al-khazneh de la mosquée de Damas et de Khirbat Mird.[18]

Avant 1975, date de la découverte de ce qui est aujourd'hui appelé « le nouveau fonds » (ou New Finds) de Sainte-Catherine, la petite collection de manuscrits christo-palestiniens – somme toute modeste en comparaison des grandes collections de manuscrits orientaux, syriaques, arméniens, coptes, géorgiens, arabes, éthiopiens … – comportait surtout des fragments de codex « anciens » y compris deux lectionnaires anciens, et trois évangéliaires médiévaux. Outre les publications de la fin du XIXe siècle et de la première moitié du XXe siècles signalés plus haut, les textes ont fait l'objet de nombre de publications récentes.[19] En plus des travaux de grammaire et de linguistique, les recherches portent sur trois axes fondamentaux : la philologie biblique, la liturgie et la codicologie. Le grand nombre de réutilisations des parchemins et les pertes de manuscrits ont eu pour résultat que la documentation christo-palestinienne est parvenue avec beaucoup de lacunes : il n'y a aucune bible complète, aucun manuscrit complet (en dehors des trois évangéliaires médiévaux) et aucun cycle liturgique complet. Même s'il a été possible, en étudiant cette documentation partielle, de proposer des hypothèses de critique textuelle du Nouveau Testament[20] et de caractéristiques codicologiques,[21] beaucoup de questions demeurent et les hypothèses restent à vérifier et certainement à corriger ; quant aux cycles liturgiques, la documentation a toujours été trop restreinte.

LA DÉCOUVERTE DU NOUVEAU FONDS

La découverte du nouveau fonds et son traitement technique novateur apporte une documentation inespérée qui augmente considérablement nos connaissances codicologiques, textuelles et liturgiques[22] de la culture araméenne christo-palestinienne qui, rappelons-le, contrairement aux cultures chrétiennes orientales encore parlées aujourd'hui, a disparu depuis six siècles environ. Parmi les nouveaux fragments christo-palestiniens nouvellement découverts, le cas du manuscrit Sin. syr. NF M56N, que je nommerai *Codex Sinaiticus liturgicus rescriptus* est à cet égard remarquable.[23]

Le nouveau fonds nous a d'abord apporté un texte syriaque fort intéressant. Le texte supérieur du ms. Sin. syr. NF M56N bien lisible (fig. 1), présente un intérêt certain tant du point de vue de la paléographie syriaque

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[17] Voir une synthèse géographique et historique sur les inscriptions christo-palestiniennes dans Desreumaux, Les inscriptions araméennes christo-palestiniennes.

[18] Voir la bibliographie dans Müller-Kessler, *Grammatik des Christlich-Palästinisch-Aramäischen*.

[19] Müller-Kessler, Christian-Palestinian Aramaic Fragments ; Müller-Kessler, An Unidentified Christian Palestinian Aramaic Fragment ; Müller-Kessler, Codex Sinaiticus Rescriptus ; Müller-Kessler & Sokoloff, *A Corpus of Christian Palestinian Aramaic,* vols. I, IIA, IIB, III, V ; Desreumaux, *Codex sinaiticus Zosimi rescriptus*.

[20] Desreumaux, Marc en araméen christo-palestinien et Desreumaux, Les types de texte.

[21] Desreumaux, Introduction à l'histoire des documents araméens melkites.

[22] Si je puis présenter ici quelques résultats de mes recherches sur la codicologie araméenne christo-palestinienne et sur une ancienne version biblique en cette langue, c'est grâce au Prof. Dr. Claudia Rapp que je tiens à remercier chaleureusement de m'avoir invité à participer à ce beau projet et d'avoir depuis plusieurs années assuré le suivi de sa réalisation, y compris mes errements dans la saisie informatique des données.
Nous sommes tous admiratifs de la hauteur de vue et de la profonde sagesse de Son Éminence Mgr Damianos qui a présidé à la conservation et à la mise en valeur du trésor inestimable qu'est la bibliothèque de Sainte-Catherine, admiratifs aussi de l'action inlassable du Père Justin ; nous leur sommes profondément reconnaissants de nous avoir associés à l'étude de ce patrimoine de l'humanité.
Quant à la technologie utilisée pour révéler les palimpsestes de la bibliothèque Sainte-Catherine du Sinaï, c'est une technique que nous devons à Early Manuscripts Electronic Library (EMEL), et dont on doit féliciter Mike Phelps et sa remarquable équipe de nous avoir donné de si beaux résultats.

[23] Philothée du Sinaï, *Nouveaux manuscrits syriaques du Sinaï*, 531–537.

que de l'histoire de la liturgie et du texte syriaque de la *peshitto* dont il témoigne à la fin du xe siècle. Il s'agit en effet d'un lectionnaire syriaque melkite daté qui se définit comme le « Livre de toutes les lectures de toute l'année des fêtes et des dimanches à *ramšo* et à la synaxe, selon l'ordo du monastère Mar-Moïse prince des prophètes, au mont Sinaï ». Écrit par le prêtre Léon, il a été achevé le 14 septembre 1244 des Grecs, soit 933 ap. J.-C. en la fête de l'exaltation de la Croix. Il contient les péricopes évangéliques du *ramšo* du dimanche et les péricopes des épîtres et des évangiles ainsi que les *mazmūrē* et les *hulōlē* de la synaxe du même dimanche, selon une *lectio continua*. Une deuxième partie contient ensuite des lectures pour les mémoires des martyrs, des défunts, des femmes martyres, des maîtres et des saints.[24]

Son apport à l'histoire de la liturgie est d'autant plus important qu'il est copieux, daté et localisé. Pour résumer sa situation dans la liturgie melkite, c'est « un précieux témoin du cycle liturgique en usage au monastère Sainte-Catherine encore appelé alors Mar-Moïse au début du xe siècle, avant la reconquête byzantine. Il témoigne précisément en 933 ap. J.-C., aux côtés des documents arabes et géorgiens, d'un usage melkite propre au monastère, mais qui reste cependant dans la tradition de la liturgie de Jérusalem dont il est un bon exemple de la conservation depuis le ive siècle tout en y ayant apporté une évolution dans le sens byzantin ».[25]

Paul Géhin en décrit son écriture estrangela comme « artificielle » ;[26] en fait, il me paraît qu'il s'agit d'une écriture syriaque melkite, l'une des premières datées et localisées de ce type d'écriture dont on a repéré des exemplaires à partir du xe siècle écrits à Antioche, dans la montagne Noire, à Sainte-Catherine du Sinaï, à Saidnaya, à Maʿlula, à Baludana en Damascène, à Nahr Kephtun, à Qara, à Elkafur, à Ḥardin, notamment. On trouve ce type d'écriture jusqu'au milieu du xixe siècle à Yabrud. Sebastian Brock nomme « Melkite serto », par exemple l'écriture du fragment Sin. syr. NF Fragment 72 du nouveau fonds du Sinaï.[27]

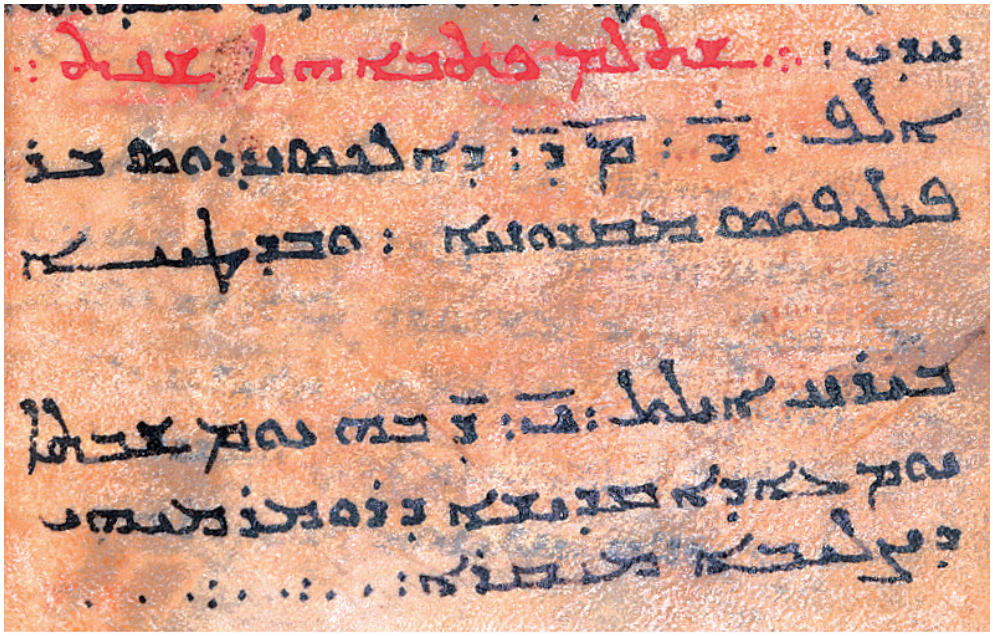

Fig. 1 : Sin. syr. NF M56N, f. 110v : le colophon du texte supérieur en syriaque melkite (cliché EMEL)
(© St. Catherine's Monastery, Sinai, Egypt)

[24] Voir la description complète par Desreumaux, Un lectionnaire syriaque melkite.
[25] Desreumaux, Un lectionnaire syriaque melkite, 204.
[26] Géhin, *Les manuscrits syriaques*, 192.
[27] Brock, *Catalogue of Syriac Fragments*, 68.

LE TEXTE INFÉRIEUR DE DEUX ANCIENS MANUSCRITS : UN SYRIAQUE MELKITE ET UN CHRISTO-PALESTINIEN

Le deuxième apport, majeur, est celui des palimpsestes réutilisés pour confectionner le lectionnaire syriaque melkite.

Grâce aux photos optico-numériques réalisées par EMEL, le texte inférieur est en grande partie lisible (fig. 4) et nombre de caractéristiques codicologiques sont discernables au point que l'on peut reconstituer le diagramme de l'un des codex d'origine, un Évangile araméen christo-palestinien ancien.

Le ms. Sin. syr. NF M56N dans son état actuel contient cent seize folios. Pour former l'actuel codex, il a été confectionné par la réutilisation de deux anciens manuscrits dont les folios démembrés ont été pliés et retaillés :

- vingt-huit folios (quatorze bifolios) d'un ancien manuscrit dont l'écriture est syriaque melkite, mais dont le texte demeure non identifié car très effacé ; ce fait est remarquable, car on ne connaissait pas jusqu'à présent de manuscrit syriaque melkite aussi ancien puisqu'il est à dater entre le VIII^e^–IX^e^ et le X^e^ siècle ; en effet, deux de ces folios (ff. 91 et 94) sont des doubles palimpsestes d'un ancien manuscrit arménien du *Livre d'Ézéchiel* daté du VIII^e^–IX^e^ siècle comme l'a identifié et décrit Jost Gippert ;[28]
- quarante-cinq folios (vingt-et-un bifolios, deux folios et deux demi-folios, soit quatre-vingt-dix folios du manuscrit actuel)[29] d'un ancien manuscrit christo-palestinien beaucoup mieux conservé et clairement identifié comme un Évangile que j'appellerai l'*Évangile christo-palestinien palimpseste du Sinaï*. C'est ce manuscrit que je présente ci-après en détail. En effet, on peut le reconstituer (partiellement puisqu'il manque des folios) avec précision et même en proposer une restitution complète de sa structure. On peut également en retrouver toutes les caractéristiques codicologiques.

UNE RECONSTITUTION CODICOLOGIQUE DE L'ÉVANGILE CHRISTO-PALESTINIEN PALIMPSESTE SIN. SYR. NF M56N

Indices pour la reconstitution des cahiers

Le point de départ de la reconstitution des cahiers a été la constatation de deux folios se suivant avec des signatures et d'une séquence textuelle ininterrompue (fig. 2) de neuf folios où se lit en continu Matthieu 13.30b – 16.27a et dont les huit premiers folios constituent incontestablement un cahier complet puisque la signature ܕ (= 4, miroir du cahier IV et début du cahier V) figure au bas du recto du premier folio de ce cahier, que la signature ܐ (= 5, numéro du cahier V) figure au bas du verso du huitième et dernier folio, tandis que la signature ܐ (= miroir du cahier V) figure au recto du neuvième folio de cette séquence, c'est-à-dire du premier folio du cahier suivant ; cette disposition correspond exactement au système de signature des manuscrits araméens christo-palestiniens, système que j'ai appelé « signatures en miroir ».[30] On vérifie que le quaternion en question est régulier, c'est-à-dire que les bifolios étaient tous imposés selon la loi de Grégory, « poil contre poil, chair contre chair » ; dans le cas présent, les cahiers sont imposés côté chair à l'extérieur.

En faisant l'hypothèse que tout le manuscrit était constitué de quaternions ainsi régulièrement imposés, on obtient un squelette de diagramme où l'on essaie de placer les folios disjoints en tenant compte de leur côté chair ou poil dans leur positionnement. Pour placer les folios à leur place, on évalue le nombre de folios perdus d'après le nombre de versets manquants, sachant que sur l'ensemble des folios conservés, le nombre de versets oscille autour de quatorze versets en moyenne par folio.

On est donc fondé à supputer le nombre de folios qui manquent entre les folios conservés. On vérifie que ce calcul s'avère pertinent pour toutes les séquences manquantes dans le squelette dont on fait l'hypothèse. En outre, lorsqu'on place les folios manquants hypothétiques entre les folios conservés, ils se trouvent en conformité avec la loi de Gregory (fig. 2). De la sorte, malgré les petites variations de longueur des versets et donc de leur nombre éventuel dans les folios manquants pour faire un texte continu, le calcul du nombre de folios manquants et l'application de la loi de Gregory convergent : en appliquant les données toutes ensemble (versets conservés, versets manquants, côtés chair et poil des folios, signatures de cahiers, titres courants), il s'avère que les folios subsistants prennent parfaitement leur place dans le squelette de quinze quaternions (fig. 3) tous imposés de la même façon et que l'on peut même proposer une foliotation du manuscrit originel reconstitué.

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[28] Voir sur le site https://sinai.library.ucla.edu (accessed 01.07.2023).

[29] Le petit fragment, numéroté f. 30 lui appartient : j'ai pu prouver qu'il est en fait un fragment détaché du f. 29.

[30] Desreumaux, [Codicology]. Christian Palestinian Aramaic Manuscripts, 134.

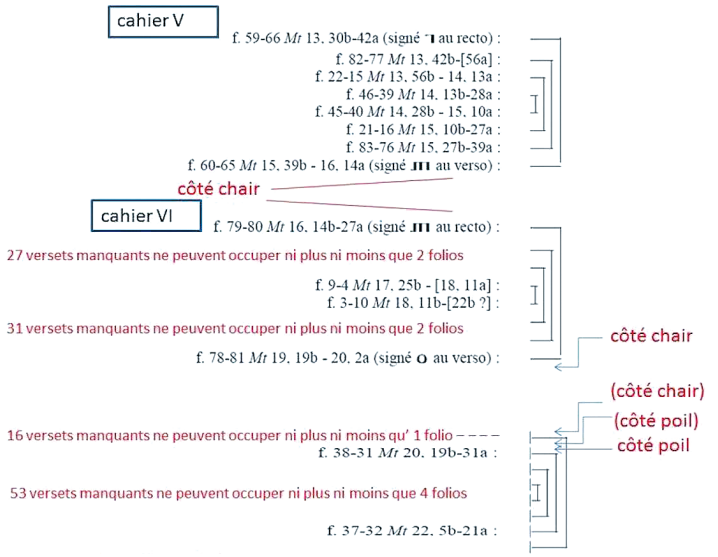

Fig. 2 : Sin. syr. NF M56N, le décompte et le placement des folios perdus du palimpseste (« f. 59–66 » etc. signifie que deux feuilles du nouveau codex, ici ff. 59 et 66, forment une seule feuille originale).

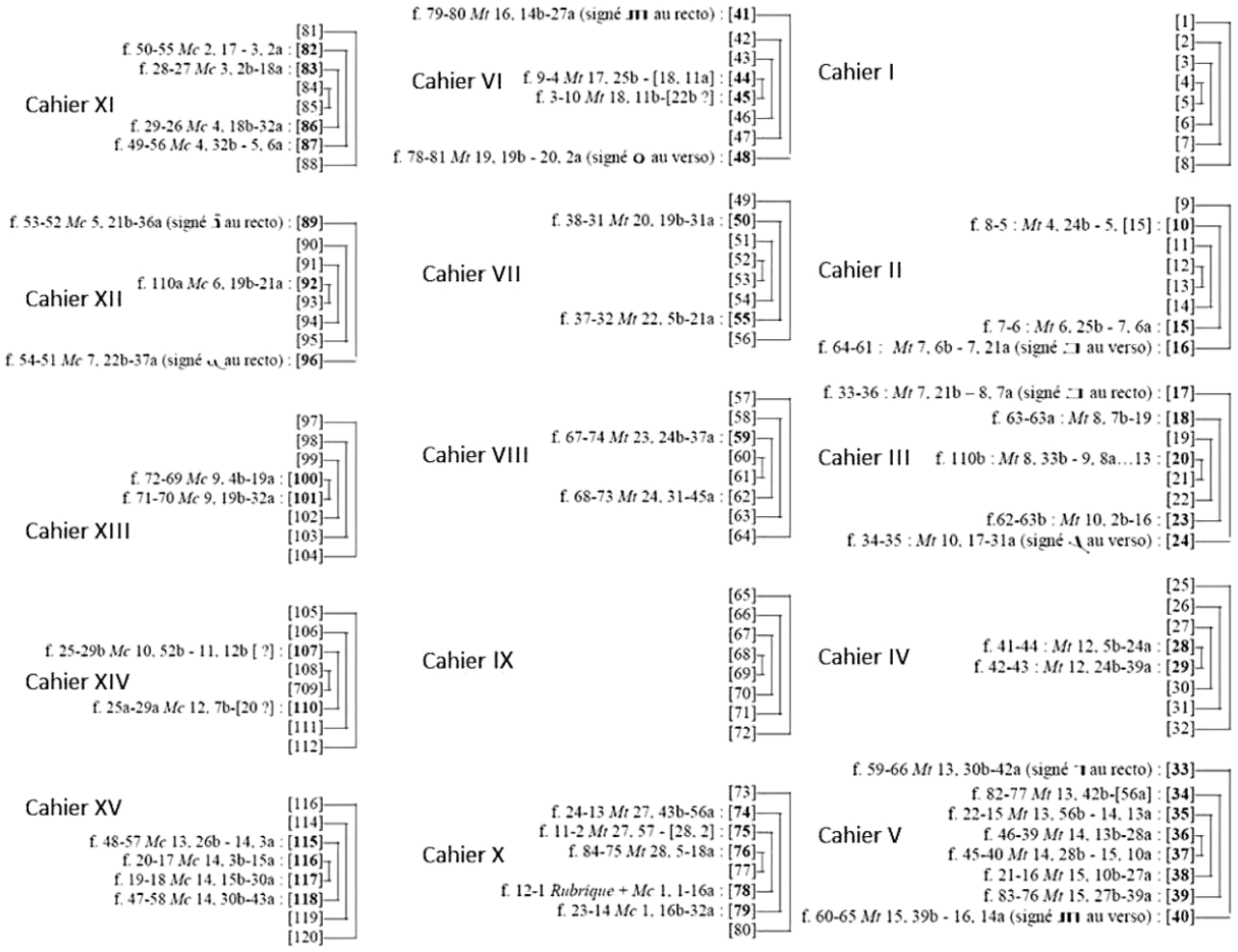

Fig. 3 : Sin. syr. NF M56N, diagramme de l'Évangile christo-palestinien palimpseste (« f. 50–55 » etc. signifie que deux feuilles du nouveau codex, ici ff. 50 et 55, forment une seule feuille originale).

La préparation du manuscrit

On discerne sur de nombreuses photos la préparation du parchemin : rectrices régulières espacées de 8,5 mm tracées à l'aide de piqûres (fig. 4) et verticales de justification.

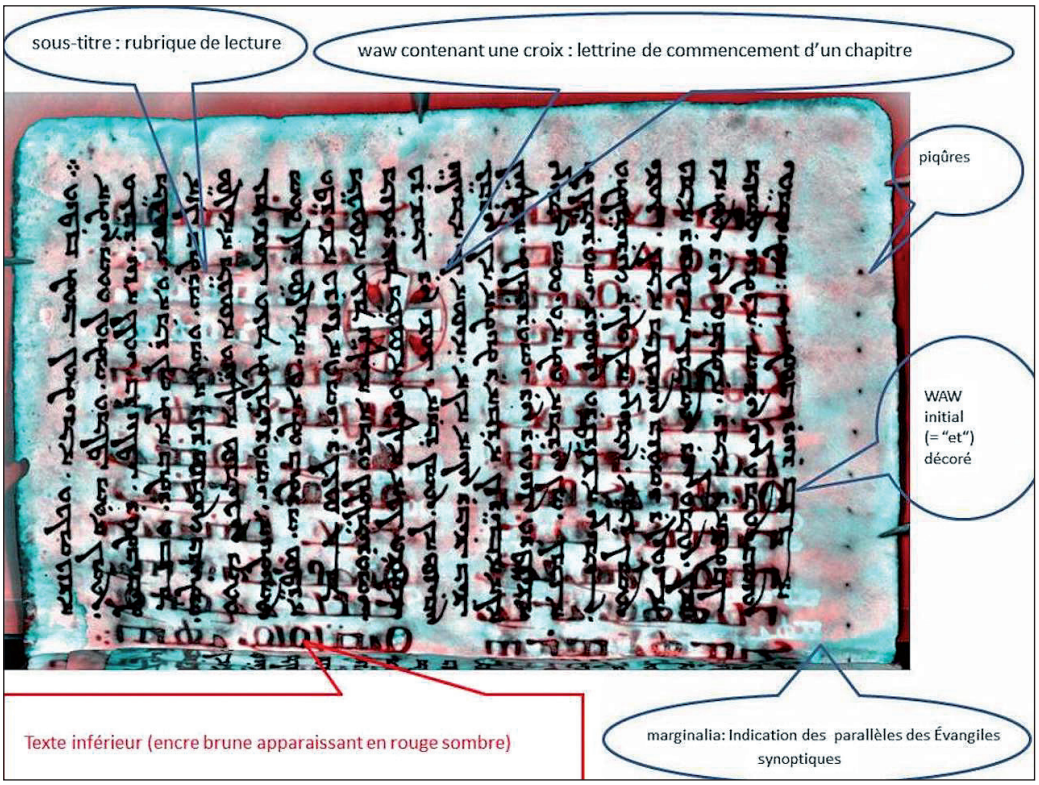

Fig. 4 : Sin. syr. NF M56N, f. 48v, photo révélant le palimpseste (cliché EMEL)
(© St. Catherine's Monastery, Sinai, Egypt)

Les indications de titre courant

À plusieurs endroits, mais pas partout, le manuscrit porte un titre courant (fig. 5). Celui-ci se trouve sur deux folios en vis-à-vis portant, dans leur marge supérieure, un titre ܒܫܪܬܐ ܕܡܬܝ ܒ, « Bonne Nouvelle de Matthieu », formé de deux mots, chacun étant centré en haut de sa page, le premier sur un verso, et le second sur le recto en vis-à-vis. La place de ces titres courant n'est pas aléatoire : de leur observation, on peut conclure qu'elle se situe toujours à la jointure de deux cahiers, le premier mot ܕܡܬܝ ܒ en haut du dernier folio du cahier et le deuxième mot, ܒܫܪܬܐ pour la première partie du manuscrit contenant *Matthieu*, en haut du premier folio du cahier suivant. On trouve ce titre en entier à la jonction des cahiers II et III (signature ܓ) et ainsi de suite : le titre courant se trouve seulement sur les folios portant les signatures.

Synthèse des caractéristiques codicologiques de l'Évangile christo-palestinien palimpseste du Sinaï (fig. 5)

Les caractéristiques codicologiques de l'Évangile reconstitué sont donc les suivantes :

- manuscrit en parchemin d'environ 125 folios de dimensions environ 260 × 200 mm ;
- il était formé de quinze quaternions réguliers, tous imposés côté « chair » à l'extérieur, signés en miroir ; les lettres des signatures sont décorées, situées au centre d'une réserve quadrangulaire blanche entre quatre pyramides formées de simples traits superposés décroissants ; les quaternions ne sont pas signés numériquement en lettres-chiffres comme dans les codex syriaques (fig. 8), mais alphabétiquement, système déjà connu des reliures christo-palestiniennes ;
- la mise en page est régulière en 2 colonnes de 23 lignes avec un interligne de 8,5 mm ; un système de

réglure est perceptible : les 4 verticales et toutes les rectrices + une ligne supplémentaire au-dessus de la première ligne du texte ; en plus, piqûre à chaque ligne au niveau de chaque rectrice, dans la marge extérieure.

Toutes ces caractéristiques codicologiques et même les dimensions sont des constantes dans les manuscrits araméens christo-palestiniens de période ancienne du VI^e^ au IX^e^ siècle ; l'Évangile du *Codex liturgicus* appartient à la catégorie des manuscrits soignés destinés à la lecture publique : imposition régulière des cahiers, préparation des réglures, signatures et titres courants toujours selon le même système que l'on peut déceler dans nombre de fragments de manuscrits de cette période.

On peut s'interroger sur son lieu de réalisation. Certes, il a été remployé par un copiste du monastère Sainte-Catherine du Sinaï, comme l'indique le colophon du lectionnaire syriaque melkite, le texte supérieur. Cela ne signifie pas qu'il avait été réalisé au monastère : il peut y avoir été apporté. Ses caractéristiques codicologiques sont en tout cas à verser au dossier des quelques manuscrits christo-palestiniens dont on peut faire une description suffisante.[31] Il est dommage que l'on ne connaisse précisément aucun lieu de copie de ces manuscrits anciens, à part le fait qu'ils ont dû être réalisés en Palestine : on peut penser à Jérusalem, à Saint-Saba, à Khirbet Mird, notamment.[32] Il faut de toute façon retenir que l'Évangile christo-palestinien palimpseste du Sinaï a été réalisé selon un protocole codicologique bien déterminé et qu'il émane d'un scriptorium qui semble avoir fonctionné selon des normes précises.

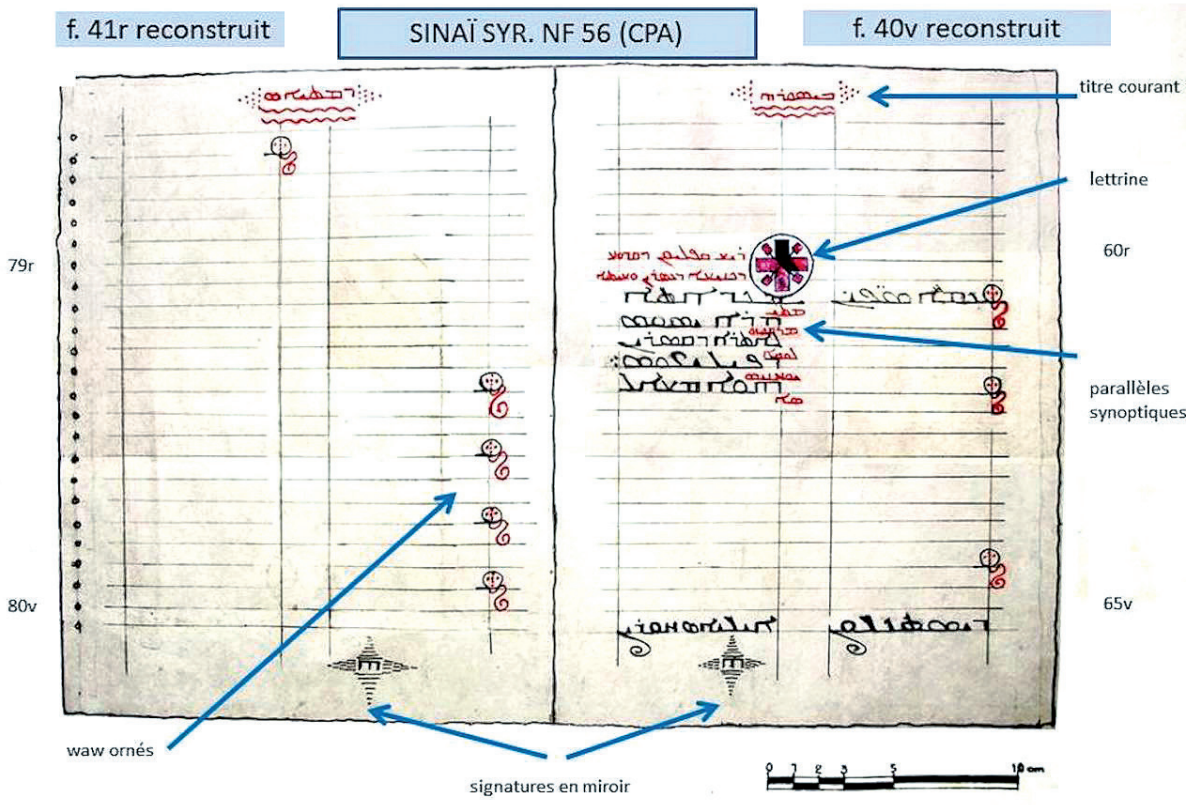

Fig. 5 : Sin. syr. NF M56N, reconstitution de la mise en page de l'Évangile christo-palestinien palimpseste.

L'écriture de l'Évangile christo-palestinien palimpseste du Sinaï

Le texte, encore perceptible sur certaines photos numériques « colour images » (RGB), était écrit à l'encre brun foncé, apparemment métallo-gallique ; celle utilisée par le copiste était vraisemblablement plus foncée à l'origine, avant le traitement d'effaçage, mais elle n'était certainement pas noire ; les sous-titres (fig. 4 et 5),

[31] Voir Desreumaux, [Codicology]. Christian Palestinian Aramaic Manuscripts, 134–135.

[32] Sur l'ensemble des documents araméens christo-palestiniens, voir Desreumaux, Introduction à l'histoire.

comme les titres courants, et les points et les volutes de décor sont d'une autre couleur que celle de l'écriture ; ils sont complètement invisibles aujourd'hui et seulement décelables sur les photos EMEL **:** ils apparaissent en blanc sur les photos « pseudocolour images» et ne sont pas toujours discernables ; ils ne se voient pas sur les photos « colour images ». Peut-on supposer avec vraisemblance qu'ils étaient en rouge ou en jaune ou même en vert ? Des lettrines (fig. 5 et 6) marquent les débuts de chapitre ; les *waw* (fig. 5) de la copule « et » en début de lignes sont systématiquement deux fois plus gros et décorés de points et de volutes ; des *marginalia* sont de même couleur que les sous-titres et les titres courants et seulement décelables sur les photos EMEL. Ils n'apparaissent que dans certaines photos.

Les lettrines (seulement pour les *waw*) et les croix en têtes de chapitre quand celui-ci ne commence pas par un *waw*, sont simples et régulières ; presque toutes de même taille (fig. 6), elles offrent toutes des variations de motifs sur les croix. À la séparation entre *Matthieu* et *Marc*, la marge supérieure est décorée d'oiseaux. L'ensemble ne participe pas d'une iconographie très élaborée et ne peut pas rivaliser avec l'iconographie des manuscrits grecs, syriaques, arméniens, géorgiens.

La calligraphie de l'Évangile christo-palestinien palimpseste du Sinaï (fig. 7) est soignée et régulière, mais élémentaire, pas vraiment élégante, dans une écriture de module 4 mm qui n'est plus vraiment de type « onciale ». Une étude comparative détaillée reste à faire. On peut déjà remarquer que cette écriture n'a pas la beauté des grandes onciales christo-palestiniennes – on pense à la graphie du *Codex Climaci rescriptus I et IV*[33] ou au texte inférieur du fragment Sin. CPA NF Fragment 7[34] par exemple – construisant soigneusement les figures par pleins et déliés puisque ces derniers, ici, n'existent pas, sauf dans la queue du *kaf* (K) final.

La ponctuation phrastique est régulière : elle utilise surtout le point triple (fig. 7, dernière photo), le double point étant moins fréquent ; la ponctuation grammaticale s'applique seulement au signalement vocalique sur le *alaph* (fig. 7, dernière photo) pour noter la voyelle /é/ et sur le *hé* (H) pour distinguer le possessif féminin du masculin.

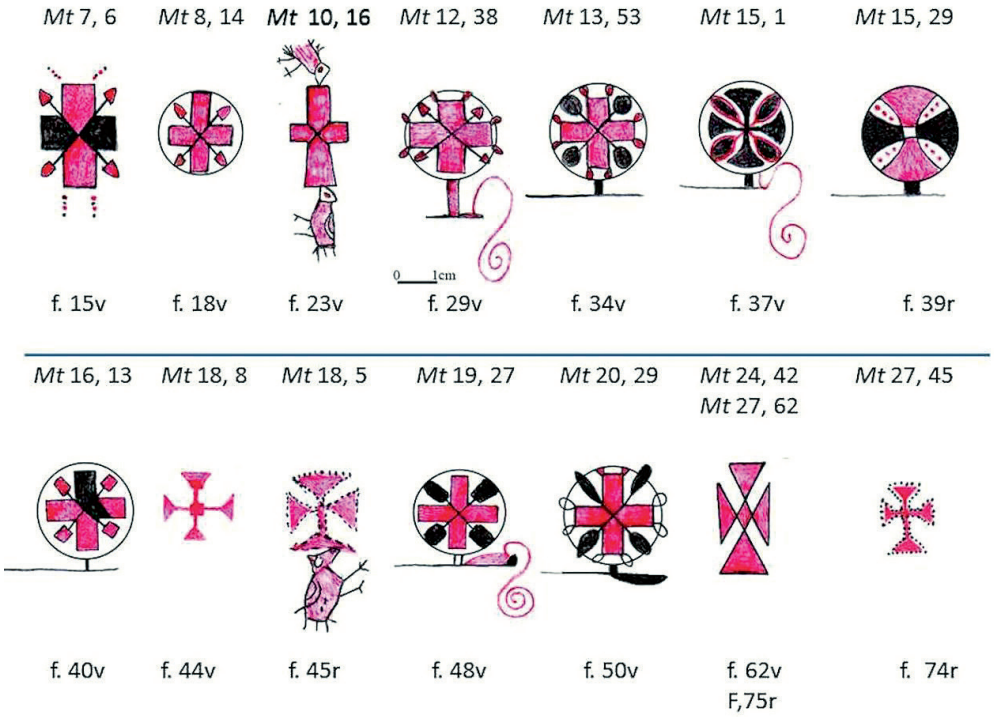

Fig. 6 : Sin. syr. NF M56N, les lettrines dans le texte de Matthieu (dessins A. Desreumaux et S. Brelaud) ; les numéros de folios représentent l'ordre reconstitué du codex (voir fig. 3).

[33] Lewis, *Codex Climaci Rescriptus*.
[34] Brock, *Catalogue of Syriac Fragments*, 83.

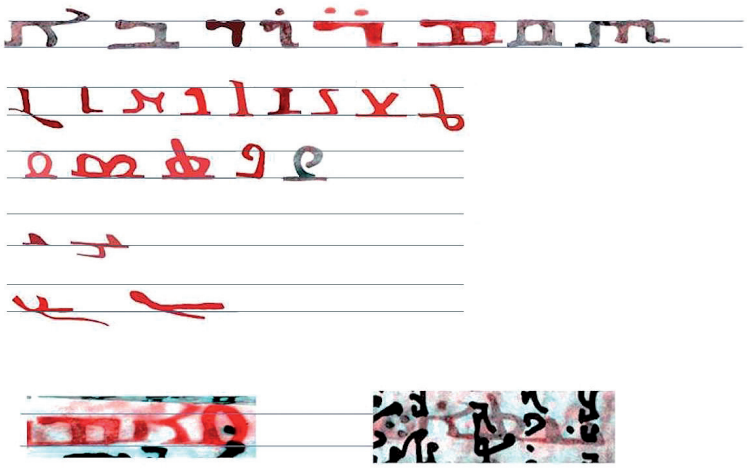

Fig. 7 : Sin. syr. NF M56N, la paléographie du palimpseste.

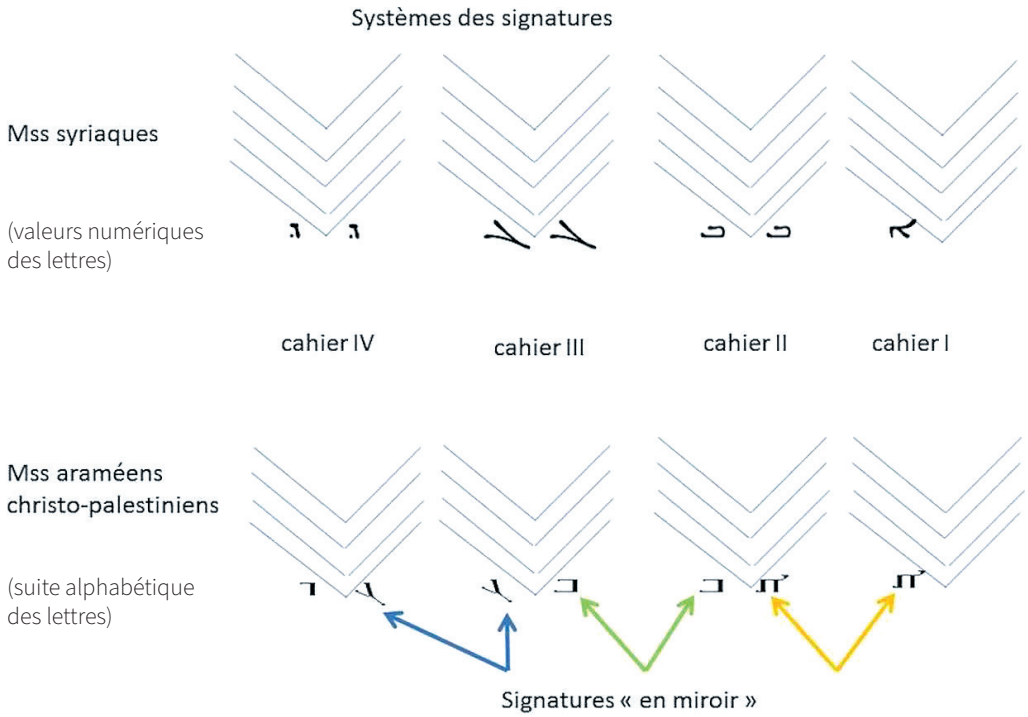

Fig. 8 : Les systèmes de signatures de cahiers.

LE TEXTE DE L'ÉVANGILE DU *CODEX SINAITICUS LITURGICUS RESCRIPTUS*

Deux Évangiles en araméen christo-palestinien

Quant au contenu, ce manuscrit est un précieux témoin de deux textes du Nouveau Testament grec traduit en christo-palestinien ; en sont maintenant lisibles de larges passages, les lacunes étant dues à la perte des folios manquants d'un codex contenant un texte continu de *l'Évangile selon Matthieu* et de *l'Évangile selon Marc*. Les parties conservées par le Sin. syr. NF M56N sont (les lacunes sont des lacunes matérielles ou des passages illisibles) :

Mt 4.24b–25a
Mt 5.3; 5
Mt 5.9b–11a
Mt 5.13b–15a
Mt 6.25b – 8.19
Mt 8.33b – 9.1a
Mt 9.2b–5a
Mt 9.6b–8
Mt 10.2b–31a
Mt 12.5b–39a
Mt 13.30b – 16.27a
Mt 17.25b–27a
Mt 18.1b–3a
Mt 18.6b–7a
Mt 18.8–9a
Mt 18.11b–13a
Mt 18.14b–16a
Mt 18.18b–19a
Mt 18.21b–22a
Mt 19.19b – 20.2a
Mt 20.19b–31a
Mt 22.5b–21a
Mt 23.24b–27a
Mt 23.29b–37a
Mt 24.31b–45a
Mt 27.43b–58a
Mt 27.60b–62a
Mt 27.64b–65a
Mt 28.1b–2a
Mt 28.5–18a
Mc 1.1–2a
Mc 1.5–6a
Mc 1.8–9
Mc 1.12b–14a
Mc 1.16b–32a
Mc 2.17 – 3.18a
Mc 4.18b – 29b
Mc 4.32b – 5.6a
Mc 5.21b–36a
Mc 6.19b–21a
Mc 6.22b–24a
Mc 6.26b–28a
Mc 6.30–31a
Mc 7.22b–37a
Mc 9.4b–32a
Mc 10.52b – 11.2a
Mc 11.3b–5a
Mc 11.7b–9a
Mc 11.10b–12a
Mc 12.7b–9a
Mc 12.11b–13a
Mc 12.14b–15a

Mc 12.17–18a
Mc 13.26b – 14.43a

Il faut souligner qu'une bonne partie des *Évangiles selon Matthieu* et *selon Marc* n'était pas encore attestée en christo-palestinien à cause des pertes matérielles ; dans la liste ci-dessus, sont donc accessibles pour la première fois grâce au ms. Sin. syr. NF M56N les versets suivants :

Mt 5.13b
Mt 7.19–23
Mt 10.2b–15
Mt 10.23–31
Mt 12.5b–29
Mt 13.30b–35
Mt 13.54b – 14.4
Mt 14.35–36
Mt 15.1–20 ; 29–31
Mt 16.1–12 ; 20–27a
Mt 18.6b–7a ; 8 ; 22
Mt 20.19–25 ; 28
Mc 2.13
Mc 3.6–17
Mc 4.40 – 5.6
Mc 5.21–23
Mc 7.22–23
Mc 9.15–16
Mc 11.7–8, 10–19
Mc 12.7b–9a ; 11b–14
Mc 13.26 – 14.43

En considérant la reconstruction que nous proposons du codex, les quinze cahiers contiennent deux Évangiles, celui *selon Matthieu* et celui *selon Marc*. Il manque, au début, Matthieu 1.1 – 4.24a, c'est-à-dire sept ou huit folios, pouvant correspondre au cahier I + le premier folio du cahier II ; étant donné la régularité de l'imposition du codex en quaternions, il faut admettre l'existence d'une page de garde au début. À la fin, il manque Marc 14.43b – 16.8 ou 16.20 selon que le texte portait ou non la fameuse « finale de Marc » absente de certains manuscrits grecs anciens. Il manque donc 6 ou 7 folios, c'est-à-dire, selon le diagramme reconstitué, les 2 derniers folios du cahier XV et 4 ou 5 folios d'un cahier XVI qu'il faut de toute façon supposer. On peut formuler l'hypothèse vraisemblable que le codex ne comportait pas plus de 16 cahiers, c'est-à-dire 128 folios, et ne contenait donc que l'Évangile selon Matthieu et l'Évangile selon Marc ; un autre codex confectionné selon la même structure aurait contenu ceux de Luc et de Jean en 18 cahiers. On peut cependant aussi envisager que les quatre Évangiles aient été contenus dans un seul codex de 33 cahiers soit 264 folios. Ces calculs demeurent hypothétiques. Cependant, il est probable qu'il s'agissait d'un tétraévangile en un ou deux tomes.

En attendant l'édition critique en cours, et d'après quelques sondages, en comparant le texte conservé par le ms. Sin. syr. NF M56N à celui du *Codex Climaci rescriptus*,[35] on peut évaluer que le type de texte représenté semble celui que j'ai nommé « la vulgate christo-palestinienne » en usage chez les chalcédoniens de Palestine et d'Arabie dès le VI^e^ siècle.[36]

[35] Lewis, *Codex Climaci Rescriptus*.
[36] Voir Desreumaux, Les types de texte.

Un système de numérotation des péricopes

Nous avons vu qu'on distingue en outre l'existence d'un système d'indication marginale de péricopes synoptiques (fig. 4 et 5) accompagnées de chiffres. Parmi de nombreux exemples, devant le verset Matthieu 13.31, est indiqué : « 21. Luc. Matthieu » ; devant le verset Matthieu 13.34, est indiqué : «1. Luc. Matthieu » ; devant le verset Matthieu 14.1, est indiqué « 11. Luc. Marc. Matthieu ». Ces indications sont encore à étudier par rapport aux canons ammoniens et aux numérotations des chapitres des éditions du Nouveau Testament.

Un système ancien de lectures liturgiques

Enfin, troisième résultat scientifique appréciable, des sous-titres numérotent des lectures (fig. 4 et 5). Un petit nombre seulement précisent le jour ou la fête liturgique à laquelle la lecture est affectée : par exemple, pour la lecture Matthieu 10.16–22, le sous-titre est « Mémoire des martyrs ». Toutefois, il est notable que la numérotation en sous-titres insérés dans le texte continu et la délimitation des péricopes ou même simplement leur *incipit* désignent dix-huit lectures sur les vingt-huit conservées, correspondant exactement aux lectures de l'ancien lectionnaire de Jérusalem mis en évidence notamment par Charles Renoux et dernièrement étudié par Stéphane Verhelst.[37] Ainsi, dans l'exemple cité, la lecture pour la mémoire des martyrs est celle du commun du tétraévangile géorgien Tbilisi A 98,[38] du ms. Sin. geo. 38,[39] du lectionnaire géorgien,[40] du *Codex Sinaiticus liturgicus* de Pétersbourg,[41] de l'évangéliaire gréco-arabe Sin. ar. 116 daté de 995/6 et du Sin. ar. 72 daté de 897.[42]

L'*Évangile palimpseste araméen christo-palestinien du Sinaï* serait donc l'un des plus proches témoins du lectionnaire grec de la liturgie de Jérusalem au début du v^e^ siècle tel qu'il est connu dans le lectionnaire géorgien. En outre, cela confirme s'il était nécessaire, le lien de la communauté araméenne christo-palestinienne à l'Église chalcédonienne de Jérusalem et même son appartenance.

D'ailleurs, la tradition araméenne melkite postérieure jusqu'à l'époque médiévale resta dans la ligne de cet héritage, bien que modifié après la byzantinisation. On en trouve les traces dans les évangéliaires christo-palestiniens médiévaux A, B et C du Sinaï édités par Agnes Smith Lewis évoqués plus haut et dans les évangéliaires du nouveau fonds dont plusieurs lectures correspondent à des lectures du palimpseste christo-palestinien ancien du *Codex Sinaiticus Liturgicus Rescriptus*, Sin. syr. NF M56N : c'est le cas des manuscrits christo-palestiniens cotés Sin. syr. NF M41N et M42N.[43]

Le monastère Sainte-Catherine du mont Sinaï est décidemment le vrai conservatoire du patrimoine manuscrit araméen chalcédonien depuis son origine au vi^e^ siècle et malgré la fin de son usage au xiv^e^ siècle.

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37 Verhelst, *Le lectionnaire de Jérusalem*, ouvrage indispensable qui donne notamment l'index des péricopes du lectionnaire de Jérusalem.

38 Description du ms., Verhelst, *Le lectionnaire de Jérusalem*, 189 ; la péricope, p. 190, porte le n° 150.

39 Index des évangiles selon le lectionnaire de Jérusalem.

40 Dont les rubriques sont éditées par Tarchnischvili (références dans Verhelst, *Le lectionnaire de Jérusalem*, 23).

41 RNB, gr. 44, éd. Thibault, *Monuments de la notation* (références dans Verhelst, *Le lectionnaire de Jérusalem*, 23).

42 Elle correspond à la rubrique n° 150 de Verhelst, *Le lectionnaire de Jérusalem*. La liste de ces lectures correspondant au système de Jérusalem sera donnée dans la publication complète du manuscrit.

43 Philothée du Sinaï, *Nouveaux manuscrits syriaques du Sinaï*, 440–447, 449–463.

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The Missing Quire of *Codex Climaci rescriptus* Containing 1–2 Corinthians in Christian Palestinian Aramaic (Sin. syr. NF M38N)[1]

Agnes Smith Lewis and Margaret Dunlop Gibson 175 years (16th April 2018)

1. BACKGROUND

When Agnes Smith Lewis and Margaret Dunlop Gibson acquired one folio of the *Codex Climaci rescriptus* (*CCR*) in Cairo in 1895, then a few years later, in 1905, eighty-nine more folios from a German scholar in Berlin,[2] then a batch of forty-eight folios in Port Tewfik in 1906,[3] the original home of this important Syriac manuscript remained a mystery. A single flyleaf had found its way into the Mingana collection, Birmingham. The Monastery of St. Catherine was always considered a possible location for the translation and copy of the codex, but this remained mere guesswork until recently, when the missing quire of the codex resurfaced among the New Finds, which had been found in a blocked-up storage room in the northern wall of the monastery in 1975.[4] The missing quire no. 18, consisting of 4 double folios with the Syriac translation of John Climacus'

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[1] The folios and the digital photographs are published with the kind permission of St. Catherine's Monastery, Mount Sinai, Egypt. The reading of the palimpsests was made possible through the Sinai Palimpsests Project conducted by the Early Manuscripts Electronic Library (EMEL). For more digital photographs and the electronic catalogue see sinai.library.ucla.edu (accessed 25.01.2021). In the catalogue by Philothée du Sinaï, *Nouveaux manuscrits*, 423 the siglum is Syr. M38N.

[2] The name of the scholar remains undisclosed, but it might have been either Friedrich Grote or Eduard Sachau, both Orientalists from Berlin. No further information can be obtained from Falcetta, *A Biography of James Rendel Harris*. Most of the Syriac manuscripts, including the then-remaining part of *Codex Climaci rescriptus*, must have been removed clandestinely from the library of St. Catherine's Monastery before the cataloguing by Agnes Smith Lewis with the help of James Rendel Harris for Lewis, *Catalogue of Syriac Manuscripts*, and after the cataloguing of the Georgian manuscripts by Tsagareli, Katalog gruzinskikh rukopisej, which concerns mostly palimpsest manuscripts. See also Hiersemann, *Katalog 500. Orientalische Manuskripte* and Strohtmann, Die orientalischen Handschriften.

[3] As first published by Lewis, *Codex Climaci Rescriptus*, 116–142. An additional single folio from the Mingana Collection was edited by Duensing, Zwei christlich-palästinisch-aramäische Fragmente, who must have had this fragment with many other Christian Palestinian Aramaic folios from the Grote Collection at his disposal before its acquisition by the Mingana Cadbury Collection Trust. His *editio princeps* is often overlooked, although the readings were improved one year later by Black, A Palestinian Syriac Leaf of Acts XXI. See also Mingana, *Catalogue of the Mingana Collection of Manuscripts*, XXV. Significant corrections to the text are found in Müller-Kessler and Sokoloff, *The Christian Palestinian Aramaic New Testament Version*, 26–45, 55–87, 94–102, 107–118, 127–133, 139–140, 155–157, 163–166, 172–178, 185–189, 192–193, 202–211, 214–218. It was possible to study the complete *Codex* with an ultra-violet lamp during several research visits to Westminster College between 1983–1995, before the sale to the controversial Green Collection in 2010, see Moss and Baden, *Bible Nation*. I had unlimited access to the *Codex* at the college library, which helped me to make such extensive improvements. The corrections to the 'Fragment of a Homily' have not yet been published. In the meantime, however, the 'Fragment of an Apostolic Myth' could be attributed to the fifth book of the *Dormition of Mary*, see Müller-Kessler, An Overlooked Christian Palestinian Aramaic Witness of the Dormition of Mary, 115–127. The edition by Michael Sokoloff, *Texts of Various Contents in Christian Palestinian Aramaic*, Orientalia Lovaniensia Analecta 235 (Leuven, 2014), together with *A Dictionary of Christian Palestinian Aramaic*, Orientalia Lovaniensia Analecta 234 (Leuven, 2014), are not considered here, since they were withdrawn from sale by the publisher because of a court settlement concerning the unauthorized print of the copyright-protected Christian Palestinian Aramaic computer font without mention of one of the font designers (Munich, LG 7 O 167/18).
Only one verso side of 1 Cor 15:42–49 (CCR2, f. 18v) reading, except for the top and bottom lines, because of a reagent employed by Agnes Lewis when she worked on it. It is questionable whether the readings could be much improved with the new multispectral technology. The new fragments demonstrate that the text on some folio sides is more than difficult to make out (see below).

[4] The description of the discovery varies in different publications. The best account is to be found in the introduction to the Greek

Liber ad pastorem,[5] was identified by Sebastian Brock as belonging to this famous Syriac manuscript.[6] This was possible due to the publication of the Syriac manuscript catalogue by Philothée du Sinaï, on the basis of one sample photo,[7] which happened to be the first folio of the quire and, as Brock was able to establish, the continuation of the flyleaf Mingana Syr. 637.[8] Unfortunately, the Syriac upper text of *Liber ad pastorem* is not yet fully complete, as the end of chapter 15 is still absent and will have been in another quire.

The task of identifying the lower text in Christian Palestinian Aramaic (CPA) was assigned to me in 2015 in the context of the Sinai Palimpsests Project, which enabled me to study the text at leisure with the help of the new multispectral imaging technology. While it was rather easy work with these folios, even with the aid of multispectral photography there is a limit to what it is possible to read in these fragile and erased palimpsest folios. Nevertheless, most of the text could be identified and only minor gaps remain.

Apart from *Codex Climaci rescriptus* (now in the Green Collection[9] and abbreviated here as CCR2) for one part of the lower manuscript, the other folios are Mingana Syr. 637[10] + Sin. syr. NF M38N[11] + Sin. syr. NF M64N.[12] The siglum CCR2 has been used in the past for the part of *CCR* containing parts of the Acts of the Apostles and the Epistles,[13] but it has become clear in the meantime that what was previously referred to as CCR2 now has to be divided into two different Bible manuscripts, CCR2A and CCR2B. The folios of CCR2A contain parts of Acts, and show a rather different scribal hand to the one containing parts of Corinthians—CCR2B—which seems to be identical to the hand of Sin. syr. NF M64N, containing parts of Hebrews. What is certain is that both are originally Bible manuscripts and do not derive from lectionaries.[14] This is clear for CCR2A from the header *Prksys* πράξεις for Acts on ff. 41v, 44r,[15] and for CCR2B from the epilogue to Corinthians on f. 123r, the prologue to Galatians on f. 123r,[16] and the absence of indications of individual lections.

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manuscripts catalogue by Nicolopoulos, *The New Finds of Sinai*. The early account by Charlesworth, *The New Discoveries in St. Catherine's Monastery*, was more on the sensationalist side. In the meantime the palimpsest double folio Sin. gr. NF M 167 mentioned on p. 32 could be identifed, see Müller-Kessler, Unparalelled Variant Readings.

5 See Lewis, *Codex Climaci Rescriptus*, XII.

6 See Brock, The Syriac 'New Finds' at St Catherine's Monastery, 48–49; Brock, *Ktabe mpassqe*, 13. Incorrectly attributed to Mingana Syr. 654 and Sin. syr. Sparagma 29 by Géhin, Fragments patristiques syriaques, 67–93. Géhin corrected this in his comprehensive study, Géhin, *Les manuscrits syriaques de parchemin du Sinaï*, 126–127. The first edition of Mingana Syr. 637 by Duensing, Zwei christlich-palästinisch-aramäische Fragmente, 42–46, has also been omitted, as is the case in many other publications on *CCR*.

7 Mother Philothée of Sinai was not aware of the connection, and Desreumaux, her subeditor for the Christian Palestinian Aramaic section, also did not make the connection. The photo with the lower script facing the manuscript description (syr. NF M38N) on p. 422 might have been insufficient to enable any identification for the catalogue by Philothée du Sinaï, *Nouveaux manuscrits*, 423: '1. Parchemin; 230 × 185 mm; huit folios. Palimpseste syro-palestinien sur deux colonnes écrites sur 175 × 60 mm, espacées de 20 mm. Écriture large et carré (Évangile?) Écriture supérieure sur une colonne de 170 × 130 mm avec 23 × 28 lignes. Serto, écriture lâche et commune. Un cahier numéroté ܕܓ. x^{e} siècle. Instructions aux moines, non numérotées, mais si l'on compte les différents alinéas séparés par quatre points rouges, il y en a 90 (de Rabbula ?)'.

8 See Brock, The Syriac 'New Finds' at St Catherine's Monastery, 48–49. There erroneously mistyped as 639.

9 Sold by Westminster Theological College directly to the Green Collection in 2010 after the unsuccessful auction by Sotheby's on July 9, 2009.

10 Folio Mingana Syr. 637 with Acts 21:14b–26a fits in between CCR2A, f. 14 with Acts 21:3b–14a and f. 41 with Acts 24:25b–25:9a.

11 See Brock, *Ktabe mpassqe*, 12–13.

12 Although it does have a deviating upper text, the lower text of f. 1 contains Hebrews 9:20–10:10b and fits in after CCR2, f. 28, with Hebrews 7:12b–27a. The scribal hand and text division look identical to CCR2A, but only 18 lines remain per column in this fragment. A photo of the recto is found in Philothée du Sinaï, *Nouveaux manuscrits syriaques*, 558, with Hebrews 9:20–10:3a, and of the verso in Desreumaux, Les manuscripts araméens christo-palestiniens, 1324, fig. 5, with Hebrews 10:3b–10b. In each column 4 lines are missing at the end, and of the second column of the recto and the first of the verso only two thirds are preserved.

13 Lewis, *Codex Climaci Rescriptus*, 84–178; Müller-Kessler and Sokoloff, *The Christian Palestinian Aramaic New Testament Version*, 26–45, 55–87, 94–102, 107–118, 127–133, 139–140, 155–157, 163–166, 172–178, 185–189, 192–193, 202–211, 214–218.

14 This was noted by Lewis, *Codex Climaci Rescriptus*, XIV. 2 Corinthians and 2 Thessalonians continue on the same folio side after the end of 1 Corinthians and 1 Thessalonians. The epilogue of 2 Corinthians also precedes Galatians 1:1–5a, again on the same side.

15 See Lewis, *Codex Climaci Rescriptus*, 90, 100; Müller-Kessler and Sokoloff, *The Christian Palestinian Aramaic New Testament Version*, 34, 45.

16 This is particularly clear from the introductory headers in the manuscript containing 1–2 Corinthians (f. 20v), and also in 1 Thessalonians (f. 24v), which were written in red and cannot be read at present, as well as before Galatians 1:1–5a (f. 123r); see Lewis, *Codex Climaci Rescriptus*, 134, 144, 168; Müller-Kessler and Sokoloff, *The Christian Palestinian Aramaic New Testament Version*, 94, 107, 172.

2. THE EIGHTEENTH QUIRE OF THE *CODEX CLIMACI RESCRIPTUS*

The parchment folios Sin. syr. NF M38N measure 225 × 180 mm, and the columns of the Christian Palestinian Aramaic text are 175 × 60 mm long with 20 mm apart with no horizontal or vertical line rulings. The lines are not justified on the left-hand side. There are eight folios for the lower text of the quire with non-continuous passages of 1–2 Corinthians, mostly unattested in Christian Palestinian Aramaic. Worth noting in connection with the text of CCR2B is that each verse begins with an enlarged initial letter which reaches into the margin. There are, however, exceptions to be noted, in 1 Corinthians 2:11; 12:13; 14. The beginning of a verse can be further indicated by four dots in the form of a rhombus shape above the enlarged letter.[17] The individual sections are indicated by *ryš qplywn*, not discernible, only to be suspected on f. 4r.

The former Lewis manuscript (Westminster Theological College) with the *Scala paradisi,* i.e. *CCR*, is now nearly complete with this missing quire of *Liber ad pastorem* containing the end of chapter 9 until about the end of chapter 15 in the Syriac upper text. The folios with the Syriac text have a deviating sequence from the lower Christian Palestinian Aramaic text, which can be established on the basis of the Greek text:[18]

1. Syr. NF M38N, f. 1r[19] inc. | ܗܠܐ ܠܚ ܙܝܗܡ ܗܠ ܕ ܠܡܝ ܗܥܡ ܝܗܒ ܗܠܪ ܫܙ
   expl. [20]. ܗܢܪ ܝܙܝܗ ܙܫܡ
   Syr. NF M38N, f. 1v inc. |ܫܢܪ ܠܚ ܗܙ ܗ ܗܠ ܗܚܗܗ
   expl. [21]❖ ܫܙ ܠܚ ܗܙ ܙ ܗܪ
2. Syr. NF M38N, f. 2r inc. |ܚܗܗ ܗܚ ܗ ܗܗܡ ܗ ܗ ܗ
   expl. [22]ܗ ܕ ,ܡ ܗ ܗ ܗ ܗ
   Syr. NF M38N, f. 2v inc. | . ܗ ܗ ܗ . ܫ ܗ ܗ
   expl. [23]. ܗ ܚ ܗ ܗ ܗ ܗ ܕ
3. Syr. NF M38N, f. 5r inc. | . ܗ ܗ ܗ ܗ . ܗ ܗ ܗ
   expl. [24],ܡ ܗ ❖ ܗ ܗ ܗ ܗ ܗ ܗ
   Syr. NF M38N, f. 5v inc. | . ܗ ܚ ܗ . ܗ ܗ ܗ ܗ
   expl. [25]ܗ ܗ ܗ . ܗ ܗ ܗ ܗ ܗ ܗ
4. Syr. NF M38N, f. 6r inc. |. ܗ ܗ ܗ ܗ ܗ ܗ
   expl. [26]ܗ ܗ ܗ ܗ ܗ ܗ ܗ ܗ
   Syr. NF M38N, f. 6v inc. | ❖ ܗ ܗ ܗ . ܫ ܗ ܗ ܗ
   expl. [27],ܡ ܗ ܗ ܗ ܗ ,ܡ ܗ ܗ ܗ

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[17] The remaining folios of Acts belonging to this codex seem to have been written by a different scribal hand, showing uneven letters and a finer ink line. Some also carry headers, e.g. *Prksys* [πράξεις] over Acts 25:25–26:3a and 27:20c–27a, when starting a new chapter. Such headers are not to be found in the rest of the former CCR2. The beginning of a chapter is illustrated there by an oversized *waw* with a decorative cross inside. Comparing the new folios of Syr. NF M38 with CCR2, it becomes pretty clear that the folios with Acts cannot be part of CCR2. Therefore, one has now to distinguish between CCR2A and CCR2B. The folios containing 2 Peter (*šlmt ʾgrth dPtrws tnyt*ʾ[sic]) and 1 John (*ʾgrth dywḥnys qmyt*ʾ) also belong to the same manuscript as Acts, now CCR2A. Both use the independent pronoun of the first plural *ʾnh* and *ʾnn* and the dependent perfect affix *-nh* and *-nn* side by side, whereas CCR2B shows only *ʾnn* and *-n*.

[18] The lower text in Greek under *CCR* was published by Moir, *Codex Climaci Rescriptus Graecus*. The upper text has a different sequence, since folio Mingana Syr. 637 fits in before Sin. syr. NF M38, f. 1 with Acts 21:14b–26a in the undertext according to Brock, *Ktabe mpassqe*, 13, but the lower text (Sin. syr. NF M38, ff. 1–8) turned out to contain the Epistles of 1–2 Corinthians (see below).

[19] Shows the quire number ܝܗ (18) in the margin for the Syriac text.

[20] Ch. 9 end–10 *PG* 88.1185.7–1188.10.

[21] Ch. 10 end–12 *PG* 88.1188.10–1189.24.

[22] Ch. 12–13 *PG* 88.1189.24–1192.6.

[23] Ch. 13 *PG* 88.1192.6–1193.10.

[24] Ch. 13 *PG* 88.1193.10–1193.30.

[25] Ch. 13 *PG* 88.1193.30–1196.4.

[26] Ch. 13 *PG* 88.1196.4–1196.32.

[27] Ch. 13 end–14 *PG* 88.1193.32–1197.34.

5.	Syr. NF M38N, f. 7r	inc.	⁘ ܕܠܐ ܢܗܘܐ ܠܗ ܕܒܥܐ ܕܐܝܟ ܕܐܢܐ ܠܟ ܐܦ ܠܐ ܐܬܝ ܠܟ ܐܦ ܠܐ ܐܬܝ ܠܟ ܐܦ ܠܐ ܐܬܝ

3. THE MANUSCRIPT OF 1–2 CORINTHIANS (CCR2B)

The remaining folios of CCR2B (Green Collection, formerly Westminster Theological College, Cambridge) and Sin. syr. NF M38N fit into the following sequential list of 1 and 2 Corinthians:

1.	Green Collection, CCR2, f. 21r	1 Cor 1:6b–12a
	Green Collection, CCR2, f. 21v	1 Cor 1:12b–17
	1 folio missing	
2.	Sin. syr. NF M38N, f. 1r	1 Cor 2:10c–15a
	Sin. syr. NF M38N, f. 1v	1 Cor 2:15b–3:5a
	1 folio missing	
3.	Green Collection, CCR2, f. 11r	1 Cor 3:17a–23
	Green Collection, CCR2, f. 11v	1 Cor 4:1–6a
4.	Green Collection, CCR2, f. 10r	1 Cor 4:6b–10a
	Green Collection, CCR2, f. 10v	1 Cor 4:10b–15b
	1 folio missing	
5.	Sin. syr. NF M38N, f. 4r	1 Cor 5:7b–11
	Sin. syr. NF M38N, f. 4v	1 Cor 5:12–6:5a
	8 folios missing	
6.	Sin. syr. NF M38N, f. 8r [v]	1 Cor 10:18b–25a
	Sin. syr. NF M38N, f. 8v [r]	1 Cor 10:25b–31a
	2 folios missing	
7.	Sin. syr. NF M38N, f. 5r [v]	1 Cor 12:12–17a
	Sin. syr. NF M38N, f. 5v [r]	1 Cor 12:17b–24a
	1 folio missing	
8.	Green Collection, CCR2, f. 19r	1 Cor 13:4–11a
	Green Collection, CCR2, f. 19v	1 Cor 13:11b–14:4a
9.	Green Collection, CCR2, f. 13r	1 Cor 14:4b–7
	Green Collection, CCR2, f. 13v	1 Cor 14:8–14a
10.	Sin. syr. NF M38N, f. 7r	1 Cor 14:14b–20a
	Sin. syr. NF M38N, f. 7v	1 Cor 14:20b–24a
11.	Green Collection, CCR2, f. 15r	1 Cor 14:24b–30a
	Green Collection, CCR2, f. 15v	1 Cor 14:30b–37a
12.	Green Collection, CCR2, f. 22r	1 Cor 14:37b–15:3a
	Green Collection, CCR2, f. 22v	1 Cor 15:3b–10a
13.	Sin. syr. NF M38N, f. 6r	1 Cor 15:10b–17a
	Sin. syr. NF M38N, f. 6v	1 Cor 15:17b–24a
14.	Green Collection, CCR2, f. 8r	1 Cor 15:24b–31a
	Green Collection, CCR2, f. 8v	1 Cor 15:31b–37
15.	Green Collection, CCR2, f. 18r	1 Cor 15:38–42a
	Green Collection, CCR2, f. 18v	1 Cor 15:42b–49a
	1 folio missing	
16.	Sin. syr. NF M38N, f. 2r	1 Cor 16:3b–10a
	Sin. syr. NF M38N, f. 2v	1 Cor 16:10b–16a
17.	Green Collection, CCR2 f. 20r	1 Cor 16:16b–24
	Green Collection, CCR2 f. 20v	2 Cor 1:1–3

18.	Green Collection, CCR2, f. 17r	2 Cor 1:23–2:4a
	Green Collection, CCR2, f. 17v	2 Cor 2:4b–2:11b
19.	Sin. syr. NF M38N, f. 3r	2 Cor 2:11c–17a
	Sin. syr. NF M38N, f. 3v	2 Cor 2:17b–3:5a
	2 folios missing	
20.	Green Collection, CCR2, f. 3r	2 Cor 4:18c–5:6a
	Green Collection, CCR2, f. 3v	2 Cor 5:6b–12b
	1 folio missing	
21.	Green Collection, CCR2, f. 6r	2 Cor 6:3a–10a
	Green Collection, CCR2, f. 6v	2 Cor 6:10b–16a
22.	Green Collection, CCR2, f. 2r	2 Cor 6:16b–7:3a
	Green Collection, CCR2, f. 2v	2 Cor 7:3b–8ak
	Several folios missing	

The translation of 1–2 Corinthians from a Greek *Vorlage* into Christian Palestinian Aramaic was made independently from any Syriac influence, although Biblical texts were translated from Greek into both languages at St. Catherine's Monastery during the same period. Thus, the variants taken into consideration for the textual transmission are indicated, but no English translation is offered as this would not serve any purpose for the understanding of the text and its transmission. What is important is the variants in relation to the Greek *textus receptus* as presented in the Greek New Testament by the Institute for New Textual Research, Münster.[38]

4. NEW ORTHOGRAPHIC, MORPHOLOGICAL, LEXICAL FEATURES, AND VARIATIONS IN CCR2B IN RELATION TO THE GREEK *VORLAGE*

4.1 New Lexical Items

In the eight folios from St. Catherine's Monastery various new lexical items and their derived forms are to be noted for Christian Palestinian Aramaic: *ʾgr̈n dqdẅmyn* συστατικῶν ἐπιστολῶν 'letters of recommendation' 2 Cor 3:1; this rather peculiar verbal root occurs again without any etymological connection in Semitics: *dš῾* τολμᾷ 1 Cor 6:1;[39] *hdyẅṭyn* ἰδιῶται 'uninstructed' 2 Cor 14:23; *mzr̈yʾ* (active participle *pael* √*zny*) πόρνοις 'fornicators' 2 Cor 5:9, with possessive suffix *mznʾ̈wy* 'his fornicators' 2 Cor 5:10; *mzdq̈pnyn* (*nomen agentis itpaal* √*zqp*) ἀντικείμενοι 'adversaries' 2 Cor 16:9; *myšr̈yn* (active participle *pael* √*yšr*) συγκρίνοντες '(we) compare' 2 Cor 2:13; *mq̈llyn* (passive participle *pael* √*qll*) ἀσχήμονα 'unattractive, indecent, uncomely' 2 Cor 12:23; *mrtnw* (active participle *afel* + *-n* /-ān/ + *-w* /-ū/ √*rty* 'to admonish' or √*rtt* 'to make tremble'[40]) ἔρις 'strife' 1 Cor 3:3; *mptln* (*nomen agentis pael* √*ptl* 'to twist'[41]) λοίδορος 'twister, perverter' 2 Cor 5:11; *mqlwn* μάκελλον < Lat. *macellum* 'meat market' for 1 Cor 10:25; *mq̈nyn* (active participle *pael* √*qny*) παραζηλοῦμεν '(we) make jealous' 2 Cor 10:22; *npštnʾ* (adjective) ψυχικός 'natural' 2 Cor 2:14; *῾wʾl* πλεονέκτης 'wicked person, godless'[42] 1 Cor 5:11; *Pnṭyqwsṭ*[43] πεντηκοστή for 1 Cor 16:8; *ʾrḥwtʾ* (infinitive *afel* √*ryḥ*) ἡ ὄσφρησις 'smelling sense' 1 Cor 12:17; *rwḥʾyt* πνευματικοῖς 'spiritually' 2 Cor 2:13; *ʾtšyryt* (perfect *ittafal* √*šyr*) ἀποταξάμενος 'I said farewell' 2 Cor 2:13; with possessive suffix *trwmthwn* ἀπαρχή 'their first fruits' 1 Cor 15:20, only attested as *trwmtʾ* in Cyril XVII 9 (CCPA V 191).

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[38] The Greek text follows the edition by Aland, *The Greek New Testament* of 1994.

[39] See Müller-Kessler and Sokoloff, *The Catechism of Cyril of Jerusalem*, 209, for other attestations. Meanwhile new attestations surfaced in the additional Cyril fragments. According to the *Comprehensive Aramaic Lexicon* (http://cal.huc.edu) this root might be connected with Arabic دسع 'to be bestow generously' (accessed 11 September 2020).

[40] For a derivation from √*rty* one would have expected the spelling *mrtynw*. Therefore, the option √*rtt* is preferable.

[41] See Dalman, *Aramäisch-Neuhebräisches Handwörterbuch*, 356b 'verdrehen, verderben'.

[42] See Dalman, *Aramäisch-Neuhebräisches Handwörterbuch*, 308a 'gottlos'; in German 'Frevler' would be better.

[43] π is spelled in Christian Palestinian Aramaic with a *P*-inversum and is represented in the transliteration by a capital *P*.

4.2 Orthographic Features and Scribal Errors

Despite being an early manuscript, CCR2B contains a number of scribal errors, as already indicated in the critical apparatus to the second edition.[44] Omission of *he* in the pronominal suffix third plural masculine *sypwn* 'their lips' 1 Cor 14:21;[45] scribal omission occurs in *bḥbtkwn* instead of the correct *bḥšbtkwn* 'in your mind' 1 Cor 14:20; *ʾwpn* < **ʾwp ʾn*? 1 Cor 16:16; in 1 Cor 15:19 the scribe or translator confuses *mswbr̈yn* with *msbr̈yn*.[46] The scribe obviously had problems with the spellings of some personal names: without expected *ṭet* in *ʾspnws* for Στεφανᾶ 1 Cor 16:15; omitting *nṭ* in *pwrṭyws* for Φορτουνάτου 1 Cor 16:15.

4.3 New Morphological Forms

An abstract noun appears in the feminine plural, but is treated as feminine singular *bÿšn* κακίας 'malice' 1 Cor 5:8; *lʾ ḥmyr* ἄζυμοι 'unleavened' 1 Cor 5:7; *ḥmyr* ζύμῃ 'yeast' 1 Cor 5:8; *ḥṣÿpyʾ* (adjective √*ḥṣp*) πλεονέκταις 'greedy, covetous' 1 Cor 5:10; *ḥrwty* ἡ ἐλευθερία μου 'my liberty' 1 Cor 10:29; *palpel* of the denominated verbal root √*šʿnn*, attested only in Christian Palestinian Aramaic *ʾšʿnn* ψαλῶ 'I shall praise' 1 Cor 14:15; *špÿpyn* (adjective √*špp*) ἐξουθενημένους 'despised' 1 Cor 6:4; *ʾšqyt ytkwn* ὑμᾶς ἐπότισα 'I gave you (milk) to drink' 1 Cor 3:2; imperfects with object suffixes for the *peʿal* first singular + second plural masculine *yḥmynkwn* ὑμᾶς … ἰδεῖν 'I will see you' 1 Cor 16:7; third singular masculine + third singular masculine *ypswlnh* αὐτὸν ἐξουθενήσῃ 'he will despise him' 1 Cor 16:11; for the *pael* a second plural masculine + first person *tšlḥwny* με προπέμψητε 'you may send me' 1 Cor 16:6.[47]

4.4 Greek Personal Names

Representation of Greek personal names in Christian Palestinian Aramaic *ʾpwlwn* for the Greek vocative Ἀπολλῶ 1 Cor 3:4 and nominative Ἀπολλῶς 1 Cor 3:5; nominative *ʾkʾyʾ* for genitive Ἀχαΐας 1 Cor 16:15; nominative *Pwlws* for Παῦλος 1 Cor 3:5; incorrect nominative *ʾspnws* Στεφανᾶς for Στεφανᾶ 1 Cor 16:15; nominative *pwrṭyws*[1] Φορτουνᾶτος for Φορτουνάτου 1 Cor 16:15 (cf. 4.2).

4.5 Variation in Translation of Greek Words into Christian Palestinian Aramaic

mzr̈yʾ (active participle *pael* √*zny*) πόρνοις 'fornicators' 1 Cor 5:9, 10, but the adjective *znʾy* πόρνος 'fornicator' 1 Cor 5:11; *lʾ ḥmyr* ἄζυμοι 'unleavened' 1 Cor 5:7; *ḥmyr* ζύμῃ 'leavened' 1 Cor 5:8;[48] *ʾtšyryt* ἀποταξάμενος 'I said farewell' 2 Cor 2:13; also in *ytšyr* ἀποτάξασθαι Lk 9:61. Unusual for Christian Palestinian Aramaic are: ὡς σαρκίνοις *hyk ldbsr* 1 Cor 3:1; ἐπεί *ʾn dy kn* 1 Cor 5:10.

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[44] See Müller-Kessler and Sokoloff, *The Christian Palestinian Aramaic New Testament Version*.

[45] The omission of *he* is rather rare in the early Christian Palestinian Aramaic period, but it can occur in the possessive plural suffix third person masculine, see Müller-Kessler, *Grammatik des Christlich-Palästinisch-Aramäischen*, 45. There are at least three other recent attestations: *pkwrwn* 'their destroyer', *mÿlktwn* 'their councils', *mdbr̈ nwn* 'their leaders' Proverbs 11:3, 13, 14 (Sing. gr. NF MG 14, f. 17/20), see Müller-Kessler, Proverbs 11:1b-15 as Transmitted in an Unpublished Christian Palestinian Aramaic Palimpsest, 160.

[46] The same error can be noted for Romans 15:12 CCR2 (CCPA IIB 67).

[47] The usage of direct object suffixes on verbs is not attested as frequently as in Samaritan and Galilean Aramaic. It is also not obvious on what basis and when the Christian Palestinian Aramaic translators decided to employ them instead of the prepositional object indicators *yt-*, *l-* plus pronominal suffixes. It is noteworthy that it tends to be more the rule in Biblical texts than in patristic and other literature. In the latter it only occurs when citing Biblical passages. For this manuscript it is striking that the translator only makes use of this alternative in chapters 1, 15, and 16 of 1 Corinthians. Did he have a different *Vorlage*, or other translations that might have influenced him? It is striking in the case of this specific manuscript that in the Syr^{p} version there are also object suffixes on the verbs. Although Christian Palestinian Aramaic is an independent Western Aramaic dialect, there was Syriac influence on the written dialect, e.g. the usage of the secondary verbal root *ytl* 'to give' and the adverbial ending -*ʾyt*, which are not typical for Western Aramaic. Also, the adaption of the *Estrangela* script for these Christian texts in the west is simply an intentional sign to distinguish the Christian texts from the Aramaic Jewish and Samaritan scripts, but has nothing to do with any kind of language influence. The Syriac impact on the late Lectionary A is of a different nature and cannot be taken into consideration for the early transmission.

[48] For the verb meaning 'to leaven' Christian Palestinian Aramaic employs *mḥmʿ* √*ḥmʿ* ζυμοῖ in Galatians 5:9 (CCPA IIB 116) in the same manuscript. Also in the late Lectionary A one finds the verb with the spelling *ḥmʿ* Luke 13:21 (Schulthess, *Lexicon Syro-palaestinum*, 66b).

5. TRANSLITERATION OF THE CHRISTIAN PALESTINIAN ARAMAIC UNDERTEXT OF SIN. SYR. NF M38N

5.1.1 Sin. syr. NF M38N, f. 1r – 1 Corinthians 2:10 (last word)–15a [photo apud Philothée du Sinaï, Nouveaux manuscrits syriaques, 421]

1	*dʾlhʾ* :.	τοῦ θεοῦ	*ʾnn mm̈llyn* :	λαλοῦμεν
	[11] *mn gr mn*[49]	[11] τίς γὰρ	*lʾ bʾwlpn*	οὐκ ἐν διδακτοῖς
	bnÿnšʾ mkr	οἶδεν ἀνθρώπων	*dḥkmʾ*	ἀνθρωπίνης σοφίας
	dbrnšʾ ʾlʾ	τὰ τοῦ ἀνθρώπου εἰ	*dm̈lyn dbnÿnš* :.	λόγοις,
5	*ʾn rwḥh*	μὴ τὸ πνεῦμα	*ʾlʾ bʾwlpnʾ*	ἀλλ᾽ ἐν διδακτοῖς
	dbrnšʾ	τοῦ ἀνθρώπου	*drwḥʾ lhlyn*	πνεύματος,
	dbgwh :.	τὸ ἐν αὐτῷ;	*dbrwḥʾ*	πνευματικοῖς
	hkdn ʾwp	οὕτως καὶ	*rwḥʾyt*	πνευματικὰ
	dʾlhʾ	τὰ τοῦ θεοῦ	*ʾnn myšr̈yn* :.	συγκρίνοντες.[50]
10	*ʾnš lʾ*	οὐδεὶς	✣ [14] *brnšʾ dy*	[14] ψυχικὸς δὲ
	ʾkr : ʾlʾ	ἔγνωκεν εἰ	*npštnʾ lʾ*	ἄνθρωπος οὐ
	ʾn rwḥh	μὴ τὸ πνεῦμα	*mqbl*	δέχεται
	dʾlhʾ :.	τοῦ θεοῦ.	*brwḥh*	τὰ τοῦ πνεύματος
	✣ [12] *ʾnn dy lʾ*	[12] ἡμεῖς δὲ οὐ	*dʾlhʾ* :	τοῦ θεοῦ·
15	*rwḥh dʿlmʾ*	τὸ πνεῦμα τοῦ κόσμου	*štyw gr hy*	μωρία γὰρ αὐτῷ
	nsb̈nn : *ʾlʾ*	ἐλάβομεν ἀλλὰ	*lh* : *wlʾ*	ἐστιν καὶ οὐ
	rwḥʾ dmn	τὸ πνεῦμα τὸ ἐκ	*ykl dykr*	δύναται γνῶναι,
	ʾlhʾ :. *lbdyl*	τοῦ θεοῦ, ἵνα	*drwḥʾyt*	ὅτι πνευματικῶς
	dnḥm[51] *mʾ*	εἰδῶμεν τὰ	*hw mtdyn* :.	ἀνακρίνεται.
20	*dʾtyhb*	ὑπὸ τοῦ θεοῦ	✣ [15] *brnʿšʾʾ dy*	[15] ὁ δὲ
	ln mn ʾlhʾ :	χαρισθέντα ἡμῖν·	*drwḥʾ dlʾ*	πνευματικὸς
	[13] *mʾ dʾwp*	[13] ἃ καὶ	*hw dʾyn*[52] :.	ἀνακρίνει [τὰ] πάντα,

5.1.2 Sin. syr. NF M38N, f. 1v – 1 Corinthians 2:15b–3:5a (Fig. 1)

1	*hw dy mn*	αὐτὸς δὲ ὑπ᾽	*ʾtwn ykl̈yn*[53] :.	δύνασθε
	ʾnš lʾ mtdyn :.	οὐδενὸς ἀνακρίνεται	[3] *ʿd kdw gr*	[3] ἔτι γὰρ
	✣ [16] *mn gr ʾydʿ*	[16] τίς γὰρ ἔγνω	*ʾtwn dbsr* :.	σαρκικοί ἐστε.
	ḥšbth	νοῦν	*hn gr dbkwn*	ὅπου γὰρ ἐν ὑμῖν
5	*dmrʾ dytl*	κυρίου, ὃς συμβιβάσει	*qn*[ ] *wmrtnw*[54]	ζῆλος καὶ ἔρις,

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[49] Not in Greek.

[50] Syr[P] ܡܬܡܫܟܚ.

[51] Syr[P] ܢܬܬܡܠܐ ܒܗ.

[52] Christian Palestinian Aramaic omits μὲν πάντα. Syr[P] ܗܘ ܒܟܠ ܡܕܡ ܕܝ ܡܫܘܝ.

[53] Syr[P] ܠܡܬܥܒܕ ܡܫܬܟܚ ܡܢ ܡܠܟܐ ܡܠܟ.

[54] The Aramaic root of *mrtnw* ‘strife’ is difficult to determine. It can be either understood as an active participle *afel* augmented by the adjective-forming suffix *-tn* + abstract suffix *-w* of √*ʾrr* ‘to curse’ or as an abstract noun formation of the adjective only attested in Syriac ܡܪܝܪ ‘bilious, poisonous’. The latter seems to be more likely. Syr[P] has here three negative terms instead of two ܩܢܐ ܡܕܝܢܐ ‘envy and strife und differences’.

	yth ʾnn	αὐτόν; ἡμεῖς δὲ[55]	*lʾ dbsr*	οὐχὶ σαρκικοί
	dḥsbth	νοῦν	*ʾtwn whyk*	ἐστε καὶ κατὰ
	dmšyḥʾ ʿmn[56] :.	Χριστοῦ ἔχομεν.	*bbrnšw ʾtwn*	ἄνθρωπον
	✣ [3:1] *wʾnʾ ʾḮyʾ*	[3:1] Κἀγώ ἀδελφοί,	*mhḮkyn* :.	περιπατεῖτε;
10	*lʾ yklyt*	οὐκ ἠδυνήθην	✣ [4] *kd gr ʾnš*	[4] ὅταν γὰρ
	dymll lkwn :	λαλῆσαι ὑμῖν	*yḥʾ ʾmr* :	λέγῃ τις·
	hyk lbnynš	ὡς πνευματικοῖς	*ʾnʾ mn*	ἐγὼ μέν εἰμι
	drwḥ ʾlʾ	ἀλλ’	*dPwlws*	Παύλου,
	hyk ldbsr	ὡς σαρκίνοις,	*ʾnʾ wḥwrn*	ἕτερος δέ·
15	*hyk ṭlÿʾ*	ὡς νηπίοις	*mn dʾnʾ*	ἐγὼ
	*bmšyḥ*ʾ[57] [2] *ḥlb*	[2] ἐν Χριστῷ. γάλα	*dʾpwlwn*[58] :	Ἀπολλῶ,
	ʾšqyt ytkwn	ὑμᾶς ἐπότισα,	*lʾ bnÿnš*	οὐκ ἄνθρωποί
	*lʾ mkwln*ʾ[59] *ʿd*	οὐ βρῶμα·	*ʾtwn* : [5] *mʾ hw*	ἐστε; [5] τί
	kdw gr lʾ	οὔπω γὰρ	*dy*[60] *lʾpwlwn*[61]	οὖν ἐστιν Ἀπολλῶς;
20	*hwyt*[*wn*] *yḴlyn*	ἐδύνασθε.	*mn*[(sic)][62] *dy hw*	τί δέ ἐστιν
	ʾlʾ ʾyt lkwn	ἀλλ’ οὐδὲ	*Pwlws* :	Παῦλος;
	ʿd kdw lyt	ἔτι νῦν	*šmšyn*	διάκονοι

5.2.1 Sin. syr. NF M38N, f. 4r – 1 Corinthians 5:7b–11

1	*dlʾ ḥmyr*[63]	ἄζυμοι·	*wlʾ ḥṣyʳ ÿ*ʾ[64]	τούτου ἢ τοῖς πλεονέκταις
	qygr psḥn	καὶ γὰρ τὸ πάσχα	*lʾ ḥtẅpyʾ*	καὶ ἅρπαξιν
	dyln ʾtnks	ἡμῶν ἐτύθη	*lʾ s̈gd*ʾ	ἢ εἰδωλολάτραις,
	*mšyḥ*ʾ[65] :. [8] *hw*ʾ	Χριστός. [8] ὥστε	*ṣlm̈y*ʾ[66] :. ʳʾnʾ	ἐπεὶ
5	*ʾwn*[67] *nʿbd*	ἑορτάζωμεν	*dy*[68] *kn npl*	ὠφείλετε
	mwʿdʾ dlʾ	μὴ	*hwʾ lkwn*	ἄρα
	bḥmyr ʿtyq :	ἐν ζύμῃ παλαιᾷ	*dtpẅqwn*	ἐκ τοῦ
	wlʾ bḥmyr[69]	μηδὲ ἐν ζύμῃ	*mn ʿlm dn*	κόσμου ἐξελθεῖν.

[55] Omitted in Christian Palestinian Aramaic.
[56] Syr^{P} ܠ ܒܗܝ.
[57] No sign indicating the end of the verse.
[58] Syr^{P} ܐܠܦܘ.
[59] Syr^{P} ܡܢܘ ܠܐ ܒܫܡ ܐܠܗܐ.
[60] Gk οὖν.
[61] Syr^{P} ܐܠܦܘ.
[62] In Christian Palestinian Aramaic *mʾ* is expected for ‘what’. Syr^{P} ܡܐ. The half verse is reversed in Syriac.
[63] Galatians 5:9 CCR2 (CCPA IIB 116) spells ‘yeast’ as ʿmyr, but verse 8 has consistently expected *ḥmyr*.
[64] Syr^{P} ܪܚܝܩܬܐ.
[65] Syr^{P} adds ܠܥܠܡ.
[66] *sgdʾ ṣlmwy* in 1 Cor 5:10–13a [T-S 12.755r + 12.756r] identified and read by me for Müller-Kessler and Sokoloff, *The Christian Palestinian Aramaic New Testament Version*, 88–89.
[67] *hwʾ ʾwn* ὥστε.
[68] δέ not in Gk.
[69] Gk has always ἄζυμος and does not distinguish between ‘unleavened’ and ‘unleavened bread’ as in Christian Palestinian Aramaic.

	dbÿšn wdbyšw[70]	κακίας καὶ πονηρίας	[11] *kdw dy kˆtˆbyt*	[11] νῦν δὲ ἔγραψα
10	*ʾlʾ bpṭyr*	ἀλλ᾽ ἐν ἀζύμοις	*lkwn dlʾ*	ὑμῖν μὴ
	ddkyw[71]	εἰλικρινείας	*ttʿrbwn* :	συναναμίγνυσθαι
	wdqwšṭ[72] :.	καὶ ἀληθείας.	*ʾn hwʾ ʾnš*	ἐάν τις
			mštm ; mn	ἀδελφὸς ὀνομαζόμενος
	[*ryš qplywn*]		*ʾḫyʾ . wyh ;*	ἢ
15			*znʾy ʾ ;*	πόρνος ἢ
	[9] *ktbyt lkwn*	[9] Ἔγραψα ὑμῖν	*sgd ṣlm̈yn*	πλεονέκτης ἢ
	bʾgrtʾ dlʾ	ἐν τῇ ἐπιστολῇ μὴ	ʾ ; *ʿwʾl*[73]	εἰδωλολάτρης
	ttʿb̈dwn[74]	συναναμίγνυσθαι	ʾ ; *mptln*[75]	ἢ λοίδορος
	lmzn̈yʾ :.	πόρνοις,	ʾ ; *rw ;*	ἢ μέθυσος
20	[10] *wlʾ Pnṭws*[76]	[10] οὐ πάντως	ʾ ; *ḥtwp*	ἢ ἅρπαξ,
	lmzn̈wy	τοῖς πόρνοις	*ʿm dgns*	τῷ τοιούτῳ
	dhdn ʿlmʾ :.	τοῦ κόσμου	*hdn lʾ t*[.]*kwl*	μηδὲ συνεσθίειν.

5.2.2 Sin. syr. NF M38N, f. 4v – 1 Corinthians 5:12–6:5a [right hand margin damaged]

1	[[12] ...] *gr*	[12] τί γάρ	*lmʾ mtdyn* :	κρίνεται [ὁ κόσμος],
	[*dy*]*dwn lhlyn*	μοι τοὺς	*lyt ʾtwn*	ἀνάξιοί ἐστε
	dlbr :. *lʾ*	ἔξω κρίνειν;	*šẅyn ddyn̈yʾ*	κριτηρίων
	lhlyn dlʾ	οὐχὶ τοὺς	✣ *špÿpyʾ*[77] :.	ἐλαχίστων;
5	*ʾtwn d̈nyn* :	ἔσω ὑμεῖς κρίνετε;	[3] *lmyt ʾtwn*	[3] οὐκ
	[13] *lhlyn dy*	τοὺς δὲ	*yd ̈yn dlml̈ʾky*	οἴδατε ὅτι ἀγγέλους
	lbr ʾlhʾ	ἔξω ὁ θεὸς	*ʾnn dʾn̈yn*	κρινοῦμεν,
	ydyn : *ʾ̈ymw*	κρινεῖ. ἐξάρατε	*dmʾ ʿnyn̈yn*	μήτι γε βιωτικά;
	lbyšʾ mn	τὸν πονηρὸν ἐξ	*dʿlm*[78] :. [4] *dyn̈yn*	[4] βιωτικὰ
10	*byntkwn* :.	ὑμῶν αὐτῶν.	*ʾwn*[79] *dʿlmʾ*[80]	μὲν οὖν κριτήρια
	[6:1] *dšʿ ʾnš*	[6:1] Τολμᾷ τις	*hwʾ lkwn*	ἐὰν ἔχητε,

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[70] While Christian Palestinian Aramaic employs two nominal derivations of the abstract usage of *byš*, Syriac shows two deviating words ܒܝܫܝܬܐ and ܒܝܫܢܝܬܐ.

[71] Christian Palestinian Aramaic has here *dkyw* as in 2 Cor 2:17 CCR2B [Syr. NF M38N].

[72] Syr[P] translates instead ܘܕܩܕܫܝܬܐ ‘and of the holiness’.

[73] The negative expression ʿwʾl ‘wicked person, godless’ does not correspond to πλεονέκτης and variants, and also not to Syr[P]. In Christian Palestinian Aramaic one would expect *ḥṣyp* for πλεονέκτης. πλεονέκτης is reversed in Christian Palestinian Aramaic with εἰδωλολάτρης. The nominal form /qattāl/ for the *nomen agentis* is spelled here *plene*, but ʿwl ‘iniquity’ Titus 2:14 CCR2 (CCPA IIB 186), where it must definitely be another noun pattern /qatal/, correct Müller-Kessler, *Grammatik des Christlich-Palästinisch-Aramäischen*, 81 accordingly. ʿwʾl has so far been attested in Western Aramaic and Syriac according to Jastrow, *A Dictionary of the Targumim*, 1050b; Dalman, *Aramäisch-Neuhebräisches Handwörterbuch*, 308a; Payne Smith, *Compendious Syriac Dictionary*, 405; Brockelmann, *Lexicon Syriacum*, 516.

[74] Gk μὴ συναναμίγνυσθαι; Syr[P] ܠܐ ܬܫܬܪܟܘܢ ܥܡ ܐܢܫ ܕܫܡܗ ܐܚ̈ܐ.

[75] The first attestation of *mptln* ‘twister, perverter’, a *nomen agentis* (active participle *pael* + *-ān*) of the verbal root √*ptl* in Aramaic.

[76] Syr[P] ܐܠ ܬܗܘ ܠܐ ܥܡ ܙܢܝ deviates and is not the literal translation of the Greek.

[77] Also ἐλάχιστος *špypy* Isaiah 60:22 (Lewis Lectionary), Matthew 5:19 (Lectionary A), see Schulthess, *Lexicon Syropalestinum*, 212.

[78] Omitted in Gk.

[79] ʾwn μὲν οὖν.

[80] Omitted in Gk.

	mnkwn dyhʾ	ὑμῶν	*lhlyn dšp̈ypyn*[81]	τοὺς ἐξουθενημένους
	ʿmʾsq lwt	πρᾶγμα ἔχων πρὸς	*bknyštʾ* :.	ἐν τῇ ἐκκλησίᾳ,
	ḥwrn dyhˀ	τὸν ἕτερον	*lhlyn ʾẏ̈bw*	τούτους καθίζετε;
15	*mtdyn lpy*	κρίνεσθαι ἐπὶ	*bʾtrkwn*[82] :.	
	ṭlwm̈yʾ wlʾ	τῶν ἀδίκων καὶ	[5] *lʾknʿwtkwn*	[5] πρὸς ἐντροπὴν
	qwdm qdyš̈yʾ :.	οὐχὶ ἐπὶ τῶν ἁγίων;	*ʾnʾ ʾmr* :.	ὑμῖν λέγω.
	[2]ˀ *lyttwn*	[2] ἢ οὐκ	*byntkwn*	οὕτως
	ydʿ̈yn dqdyš̈yʾ	οἴδατε ὅτι οἱ ἅγιοι	*ʾwp lʾ ḥd*	οὐκ ἔνι ἐν ὑμῖν οὐδεὶς
20	*ydwn̈wn ʿlmʾ* :.	τὸν κόσμον κρινοῦσιν;	*ḥkym hdn*	σοφός, ὃς
	wʾn bkwn	καὶ ἐν ὑμῖν	*dykl dydwn*	δυνήσεται διακρῖναι

5.3.1 Sin. syr. NF M38N, f. 8r [v] – 1 Corinthians 10:18b–25a

1	*lʾ hlyn dʾk̈lyn*	οὐχ οἱ ἐσθίοντες	*wmn kshwn*	καὶ ποτήριον
	nkyšẗʾ	τὰς θυσίας	*dš̈ydyʾ* :. *lyt*	δαιμονίων, οὐ
	hnwn šẅtpyn	κοινωνοὶ	*ʾtwn yk̈lyn*	δύνασθε
	lmdbḥʾ :.	τοῦ θυσιαστηρίου εἰσίν;	*dthwn šwẗpyn*	τραπέζης
5	[19] *mʾ*[83] *ʾwn ʾnʾ*	[19] Τί οὖν	*lptwrh*	κυρίου
	ʾmr :	φημι;	*dmrʾ* :.	μετέχειν
	dnkystʾ	ὅτι εἰδωλόθυτόν	*wlptwrhwn*	καὶ τραπέζης
	dṣlmʾ klwm	τί	*dš̈ydyʾ* :. [22]ˀ	δαιμονίων. [22] ἢ
	hy :ˀ	ἐστιν ἢ	*mq̈nyn ʾnn*	παραζηλοῦμεν
10	*dṣlmʾ klwm*	ὅτι εἴδωλόν	*lmrʾ* : *bmʾ*	τὸν κύριον; μὴ
	hw :. [20] *ʾlʾ*	τί ἐστιν; [20] ἀλλ’	*ḥywẅlyn ʾnn*	ἰσχυρότεροι αὐτοῦ
	mʾ dnkš̈yn	ὅτι ἃ θύουσιν,	*mnh* :. [23] *kwlʾ*	ἐσμεν; [23] Πάντα
	myn̈yʾ lš̈ydyʾ	δαιμονίοις	*šlyṭ ʾlʾ*	ἔξεστιν, ἀλλ’
	hnwn nkš̈yn	καὶ οὐ θεῷ	*lʾ kwlʾ*	οὐ πάντα
15	*wlʾ lʾlhʾ* :.	θύουσιν·	*mhn*[84] *kwlʾ*	συμφέρει· πάντα
	lytnʾ dy[85]	οὐ	*šlyṭ ʾlʾ*	ἔξεστιν, ἀλλ’
	ṣbˀ dthwn	θέλω δὲ ὑμᾶς	*lʾ kwlʾ*	οὐ πάντα
	šwẗpyn	κοινωνοὺς	*mbnˀ* :. [24] *ʾnš*	οἰκοδομεῖ. [24] μηδεὶς
	lš̈ydyʾ :. [21] *lyt*	τῶν δαιμονίων γίνεσθαι.	*lʾ yhˀ bʿˀ*	τὸ ἑαυτοῦ ζητείτω
20	*ʾtwn yk̈lyn*	[21] οὐ δύνασθε	*dgrmh* : *ʾlʾ*	ἀλλὰ
	dthwn š̈tyn	ποτήριον κυρίου	*dḥbrh* :.	τὸ τοῦ ἑτέρου.
	mn ksh dmrʾ :	πίνειν	[25] *kwl mʾ*	Πᾶν τὸ

[81] Syr[P] ܟܣܝ ܕܚܪܢ.
[82] Expressed differently in Gk.
[83] At the beginning of the verse the *mem* is not enlarged.
[84] Syr[P] ܡܢ.
[85] Omitted in Gk.

5.3.2 Sin. syr. NF M38N, f. 8v [r] – 1 Corinthians 10:25b–31a

1	*dmzdbn*	ἐν μακέλλῳ	*lʾ tykẅlwn* :.	μὴ ἐσθίετε δι’
	bmqlwn hww	πωλούμενον	*lbdyl hw*	ἐκεῖνον τὸν
	ʾk̈lyn wklwm	ἐσθίετε μηδὲν	*ʾwdʿ* :	μηνύσαντα
	lʾ tpr̈šwn	ἀνακρίνοντες	*wlbdyl*	καὶ τὴν
5	*lbdyl ḥšbtʾ* :.	διὰ τὴν συνείδησιν·	*ḥšbtʾ* :.	συνείδησιν·
	[26] *dmrʾ gr*	[26] τοῦ κυρίου γὰρ	[29] *ḥšbtʾ dy*	[29] συνείδησιν
	hy ʾrʿʾ	ἡ γῆ	*ʾnʾ ʾmr lʾ*	δὲ[86] λέγω οὐχὶ
	wmwlyh :.	καὶ τὸ πλήρωμα αὐτῆς.	*dyly ʾlʾ*	τὴν ἑαυτοῦ ἀλλὰ
	✣ [27] *ʾn qrʾ ytkwn*	[27] εἴ τις καλεῖ ὑμᾶς	*dḥwrn . lmʾ*	τὴν τοῦ ἑτέρου. ἵνατί
10	*ʾnš mn hlyn*	τῶν	*gr ḥrwty*	γὰρ ἡ ἐλευθερία μου
	dlʾ mhym̈nyn .	ἀπίστων	*mtdynʾ mn*	κρίνεται ὑπὸ
	wʾtwn ṣb̈yn	καὶ θέλετε	*ḥšbʾ ḥwry* :.	ἄλλης συνειδήσεως
	dtyzlwn : *kwl*	πορεύεσθαι, πᾶν τὸ	✣ [30] *ʾn ʾnʾ bḥsd*	[30] εἰ ἐγὼ χάριτι
	ḥmr mtsym	παρατιθέμενον	*nsb . lmʾ*	μετέχω, τί
15	*qwdmykwn*	ὑμῖν	*mtgdp ʿly*	βλασφημοῦμαι ὑπὲρ
	hww ʾk̈lyn	ἐσθίετε	*ʿl mʾ dʾnʾ*	οὗ ἐγὼ
	wklwm lʾ	μηδὲν	*mštwdʾ* :.	εὐχαριστῶ;
	thwn mpr̈šyn	ἀνακρίνοντες	[31] *ʾn ʾwn ʾk̈lyn*	[31] Εἴτε οὖν ἐσθίετε
	lbdyl ḥšbtʾ :.	διὰ τὴν συνείδησιν.	*ʾtwn wʾn*	εἴτε
20	✣ [28] *ʾn dy ymwr*	[28] ἐὰν δέ τις	*štyn ʾtwn* :.	πίνετε
	lkwn ʾnš	ὑμῖν εἴπῃ, Τοῦτο	*wʾn mʾ*	εἴτε τι
	hdn dbḥ hw .	ἱερόθυτόν ἐστιν,	*dʾtwn ʿb̈dyn* :	ποιεῖτε

5.4.1 Sin. syr. NF M38N, f. 5r [v] – 1 Corinthians 12:12–17a

1	[12] *hyk mʾ gr*	[12] Καθάπερ γὰρ	*lyt hw ḥd*	οὐκ ἔστιν ἓν
	dpwgrʾ ḥd	τὸ σῶμα ἕν	*ʾbr ʾlʾ sgy* :.	μέλος ἀλλὰ πολλά.
	hw wʾbr̈yn	ἐστιν καὶ μέλη	✣ [15] *ʾn tymwr*	[15] ἐὰν εἴπῃ
	sgy ʾyt	πολλὰ ἔχει,	*ryglʾ dlyt*	ὁ πούς· ὅτι οὐκ
5	*bh* : *kwl dy*	πάντα δὲ	*ʾnʾ ʾyd* :	εἰμὶ χείρ,
	ʾbr̈wy	τὰ μέλη	*lyt ʾnʾ mn*	οὐκ εἰμὶ ἐκ
	dpwgrʾ	τοῦ σώματος	*pwgrʾ* : *dmʾ*	τοῦ σώματος, οὐ
	dhnwn sgy :	πολλὰ ὄντα	*lbdyl kdn lyt*	παρὰ τοῦτο οὐκ
	ḥd dy pwgr	ἕν ἐστιν σῶμα	*hy mnh mn*	ἔστιν ἐκ
10	*hw hkdn*	οὕτως	*pwgrʾ* :.	τοῦ σώματος;
	ʾwp mšyḥʾ :.	καὶ ὁ Χριστός·	✣ [16] *wʾn tymwr*	[16] καὶ ἐὰν εἴπῃ
	[13] *qygr bḥd*	[13] καὶ γὰρ ἐν ἑνὶ	*ʾydnʾ dlyt?*	τὸ οὖς· ὅτι οὐκ
	rwḥ ʾnn	πνεύματι	*ʾnʾ ʿyn* : *lyt*	εἰμὶ ὀφθαλμός, οὐκ

[86] Omitted in Christian Palestinian Aramaic.

	kwlh bḥd	ἡμεῖς πάντες εἰς ἓν	*ʾnʾ mn pwgrʾ* :	εἰμὶ ἐκ τοῦ σώματος,
15	*pwgr ʾṣṭbʿnn* .	σῶμα ἐβαπτίσθημεν,	*dmʾ lbdyl*	οὐ παρὰ τοῦτο
	ʾn ywdÿy :	εἴτε Ιουδαῖοι	*kdn lyt hy*	οὐκ ἔστιν
	ʾn ʾr̈myy[87] :	εἴτε Ἕλληνες,	*mnh mn*	ἐκ τοῦ
	wʾn ʿb̈dyn :	εἴτε δοῦλοι	*pwgrʾ* :	σώματος;
	wʾn bn̈y ḥr̈yn :.	εἴτε ἐλεύθεροι,	✣ [17] *ʾn kwlh*	[17] εἰ ὅλον
20	*wkwl bḥd*	καὶ πάντες ἓν	*pwgrʾ ʿyn* .	τὸ σῶμα ὀφθαλμός,
	rwḥ ʾyš̈tynn :.	πνεῦμα ἐποτίσθημεν.	*hn hw*	ποῦ ἡ
	[14] *qygr pwgrʾ*	[14] καὶ γὰρ τὸ σῶμα	*mšmwʿʾ*	ἀκοή;

5.4.2 Sin. syr. NF M38N, f. 5v [r] – 1 Corinthians 12:17b–24a

1	*wʾn kwlh*	εἰ ὅλον	*lr̈ygly ʾ lyt*	τοῖς ποσίν, χρείαν
	mšmwʿ hn	ἀκοή, ποῦ	*ʾnʾ sryk lk̈yn* :.	ὑμῶν οὐκ ἔχω·
	hy ʾrḥwtʾ[88] :.	ἡ ὄσφρησις;	[22] *ʾlʾ mn dytyr*	[22] ἀλλὰ πολλῷ μᾶλλον
	[18] *kdw dy ʾtqn*	[18] νυνὶ δὲ ὁ θεὸς	*ʾbr̈yʾ dmḥ̈šbyn*	τὰ δοκοῦντα μέλη
5	*ʾlhʾ ʾbr̈yʾ*	ἔθετο τὰ μέλη, ἀσθενέστερα	*bʾš̈yn dpwgrʾ* .	τοῦ σώματος
	kwy[(sic)] *ḥd*	ἓν ἕκαστον	*ḥbÿbyn*[89] *hnwn* :.	ὑπάρχειν ἀναγκαῖά ἐστιν,
	mnhwn	αὐτῶν	✣ [23] *whlyn dʾnn*	[23] καὶ ἃ
	bpwgrʾ	ἐν τῷ σώματι	*sbyr̈yn*	δοκοῦμεν
	hyk dṣbʾ :.	καθὼς ἠθέλησεν.	*dhnwn mzl̈lwy*[90]	ἀτιμότερα εἶναι
10	✣ [19] *ʾlw dy hwʾ*	[19] εἰ δὲ ἦν	*dpwgrʾ . lhlyn*	τοῦ σώματος τούτοις
	kwlh ḥd	τὰ πάντα ἓν	*ʾyqr mytr*	τιμὴν περισσοτέραν
	ʾbr . hn	μέλος, ποῦ	*ʾnn*[91] *mtq̈nyn*[92] :.	περιτίθεμεν,
	hwʾ pwgrʾ :.	τὸ σῶμα;	*whlyn dln*	καὶ τὰ ἀσχήμονα
	[20] *kdw dy sgy*	[20] νῦν δὲ πολλὰ	*mq̈llyn*[93] *ʾyqr*	ἡμῶν εὐσχημοσύνην
15	*mn*[94] *ʾbr̈yn ḥd*	μὲν μέλη, ἓν	*mytr lhwn* :.	περισσοτέραν ἔχει,
	dy pwgr :.	δὲ σῶμα.	[24] *hlyn dy*	[24] τὰ δὲ
	[21] *lʾ ykl ʿynʾ*	[21] οὐ δύναται δὲ[95]	*myqr̈yn ln lʾ*	εὐσχήμονα ἡμῶν οὐ
	dtymwr	ὁ ὀφθαλμὸς εἰπεῖν	*sr̈ykyn* :. *ʾlʾ*	χρείαν ἔχει. ἀλλὰ

[87] Syr^{P} ܪܘܚܐ.
[88] Christian Palestinian Aramaic nominalized infinitive *afel* √*rwḥ* ‘smelling sense’; Syr^{P} ܐܦܝܘ ܪܘܚܐ.
[89] Christian Palestinian Aramaic ‘loved’ ≠ Gk ἀναγκαῖά ‘necessary’; Dam^{i} *ṣwr*[*k*]; Syr^{P} ܨܒܝܐ.
[90] Christian Palestinian Aramaic ‘less honourable ones’ is a nominalized passive participle *pael* √*zll* ‘to despise’ ≠ ἀτιμότερα ‘unpunished’ as in Dam^{i} (CCPA IIB 92); Syr^{P} ܡܙܠܝܢ.
[91] The parallels with the variant Dam^{i} (CCPA IIB 92) are underlined. As long as the Damascus texts in the Islamic Museum in Istanbul remain uncollated, the variants cannot be taken as reliable.
[92] Christian Palestinian Aramaic active participle *afel* √*tqn* ‘to equip’ ≠ Gk περιτίθεμεν ‘enclosed’; Syr^{P} ܡܣܓܝܢ ‘we enlarge’.
[93] Christian Palestinian Aramaic active participle *pael* √*qll* ‘to disdain, despise’; Syr^{P} ܩܠܝܢ ‘we do’.
[94] Syr^{P} nil.
[95] Omitted in Christian Palestinian Aramaic.

	lʾdn ʾ(sic)[96] *lyt*	τῇ χειρί·	*ʾlhʾ mzg*	ὁ θεὸς συνεκέρασεν
20	*ʾnʾ ṣrykʾ*	χρείαν σου	*pwgrʾ* :. *wldn*	τὸ σῶμα τῷ
	lyky :. ʾ ;	οὐκ ἔχω, ἢ	*dḥsyr yhb*	ὑστερουμένῳ περισσοτέραν
	twb ryšʾ	πάλιν ἡ κεφαλὴ	*ʾyqr mwtr* :.	δοὺς τιμήν,

5.5.1 Sin. syr. NF M38N, f. 7r – 1 Corinthians 14:14b–20a

1	*rwḥy mṣlyʾ* :	τὸ πνεῦμά μου	[17] *ʾt mn gr*	[17] σὺ μὲν γὰρ
	ḥšbt ʾ[97] *dy*	προσεύχεται,	*ṭbʾytʾt*	καλῶς
	dlʾ pyr̈yn[98]	ὁ δὲ νοῦς μου	*mštwd*ʾ ; :.	εὐχαριστεῖς,
	hwyʾ :. [15] *mʾ*	ἄκαρπός ἐστιν. [15] τί	*ʾlʾ ḥbrk*	ἀλλ᾽ ὁ ἕτερος
5	*ʾwn ʾyt hw*	οὖν ἐστιν; προσεύξομαι	*lʾ mtbn*ʾ ; :.	οὐκ οἰκοδομεῖται .
	ʾṣlʾ brwḥy :	τῷ πνεύματι,	[18] *mwd*ʾ ; *ʾnʾ*	[18] εὐχαριστῶ
	ʾslʾ dy ʾwp	προσεύξομαι δὲ καὶ	*lʾlhʾ*	τῷ θεῷ,
	bḥšbty :.	τῷ νοΐ	*dmwtr mn*	πάντων ὑμῶν
	ʾšʿnn[99] *brwḥy* :	ψαλῶ τῷ πνεύματι,	*kwlkwn ʾnʾ*	μᾶλλον
10	*ʾšʿnn dy ʾwp*	ψαλῶ δὲ καὶ	*mmll*	γλώσσαις
	bḥšbty :.	τῷ νοΐ·	*blyš̈nyn* :. [19] *ʾlʾ*	λαλῶ· [19] ἀλλὰ
	[16] *lgll dʾn*	[16] ἐπεὶ ἐὰν	*bknyštʾ*	ἐν ἐκκλησίᾳ
	tbrk brwḥy :.	εὐλογῇς [ἐν][100] πνεύματι,	*ʾnʾ ṣbʾ* ;	θέλω
	*hdn dmml*ʾ ;	ὁ ἀναπληρῶν	*dymll ḥmš*	πέντε λόγους
15	*ʾtrh*	τὸν τόπον	*m̈lyn bḥšbty*	τῷ νοΐ μου λαλῆσαι,
	dhydywṭʾ :	τοῦ ἰδιώτου	*lbdyl dʾwp*	ἵνα καὶ
	hyk hw	πῶς	*ḥwr̈nyn dʾmr* :	ἄλλους κατηχήσω,
	ʾmr ʾmyn	ἐρεῖ τὸ ἀμήν	ʾ ; *rbw*	ἢ μυρίους
	ʿlʾštwdywtk	ἐπὶ τῇ σῇ εὐχαριστίᾳ;	*dm̈lyn blyn̈šyn*	λόγους ἐν γλώσσῃ.
20	*lbdyl mʾ*	ἐπειδὴ τί	*dytyr*[101] :.	
	dʾt ʾmr .	λέγεις	[20] *ʾḫyʾhlʾ thwn*	[20] Ἀδελφοί, μὴ
	lʾ ydʿ :.	οὐκ οἶδεν·	*yl̈dyn thwn*	παιδία γίνεσθε

5.5.2 Sin. syr. NF M38N, f. 7v – 1 Corinthians 14:20b–24a (Fig. 2)

1	*bḥbtkwn*(sic)[102] :	ταῖς φρεσὶν	*lʾ lhlyn dlʾ*	οὐ τοῖς
	ʾlʾ lbyštʾ	ἀλλὰ τῇ κακίᾳ	*mhym̈nyn*	ἀπίστοις
	hww ṭl̈yn :	νηπιάζετε,	*ʾlʾ lhlyn*	ἀλλὰ τοῖς

[96] Christian Palestinian Aramaic has instead ‘the ear’ for τῷ ὠτί; Syr^{p} ܐܘܕܢܐ.
[97] Syr^{p} ܡܚܕ.
[98] Christian Palestinian Aramaic *dlʾ pyr̈yn mdb* ‘without fruits; Syr^{p} ܒܠܝ ܦܐܪܝ ≠ Gk ἄκαρπος.
[99] Christian Palestinian Aramaic *ʾšʿnn* ψαλῶ.
[100] Omitted in Gk, but in Christian Palestinian Aramaic *b-*.
[101] Not in Gk.
[102] Scribal error for *bḥšbtkwn*.

	bḥšbtkwn dy	ταῖς δὲ φρεσὶν	*dmhÿmnyn* :.	πιστεύουσιν.
5	*hww šwl̈myn* :.	τέλειοι γίνεσθε.	✣[23] *ʾn ʾwn ttknš*	[23]Ἐὰν οὖν συνέλθῃ
	[21] *bnymwsʾ*	[21] ἐν τῷ νόμῳ	*kwlh. knyštʾ*	ἡ ἐκκλησία ὅλη
	gr[103] *ktyb* :	γέγραπται	*hyk ḥdʾ* :	ἐπὶ τὸ αὐτὸ
	dbl̈yšnyn	ὅτι ἐν	*wkwlhwn*	καὶ πάντες
	ḥwr̈nyn	ἑτερογλώσσοις	*yhwn mm̈llyn*	λαλῶσιν
10	*wbsypwn*(sic)	καὶ ἐν χείλεσιν	*blyš̈nyn* : *yʿẅlwn*	γλώσσαις, εἰσέλθωσιν
	dḥwr̈nyn ymll	ἑτέρων λαλήσω	*dy hdyẅtyn* :	δὲ ἰδιῶται
	lh dn qhlʾ :	τῷ λαῷ τούτῳ	*ʾ ʾnšyn dlʾ*	ἢ ἄπιστοι,
	wʾwp kn lʾ	καὶ οὐδ᾽ οὕτως	*mhÿmnyn lʾ*	οὐκ
	yšm̈wʿwn ly	εἰσακούσονταί μου,	*ʾmr̈yn dʾtwn*	ἐροῦσιν ὅτι
15	*ʾmr mrʾ* :.	λέγει κύριος.	*mš̈ttyn* :. [24] *ʾn*	μαίνεσθε; [24] ἐὰν
	[22] *hwʾ lyšn̈yʾ*	[22] ὥστε αἱ γλῶσσαι	*dy kwlʾ yhwn*	δὲ πάντης
	lʾṫ hnwn	εἰς σημεῖόν εἰσιν	*mtn̈byn* : *yʿwl*	προφητεύωσιν,
		εἰσέλθῃ		
	lʾ lhlyn	οὐ τοῖς	*dy ʾnš dlʾ*	δὲ τις
	dmhÿmnyn :	πιστεύουσιν	*mhymn ʾ ʾ*	ἄπιστος ἢ
20	*ʾlʾ lhlyn dlʾ*	ἀλλὰ τοῖς	*hdywṭys* :	ἰδιώτης,
	mhÿmnyn	ἀπίστοις,	*mtkwn hw*	ἐλέγχεται
	nbywtʾ dy :	ἡ δὲ προφητεία	*mn kwlʾ* .	ὑπὸ πάντων,

5.6.1 Sin. syr. NF M38N, f. 6r – 1 Corinthians 15:10b–17a

1	*ʾlʾ ytyr*	ἀλλὰ περισσότερον	*ryqnʾ hy*	κενὸν ἄρα[104] [καὶ]
	mn kwlhwn	αὐτῶν πάντων	*ʾkrzwtn* :.	τὸ κήρυγμα ἡμῶν,
	lʾyt :. *lʾ*	ἐκοπίασα, οὐκ	*ryqnʾ hy ʾwp*	κενὴ καὶ
	ʾnʾ ʾlʾ	ἐγὼ δὲ[105] ἀλλὰ	*hymnwtkwn* :.	ἡ πίστις ὑμῶν·
5	*ḥsdh dʾlhʾ*	ἡ χάρις τοῦ θεοῦ [ἡ]	[15] *mštk̈ḥyn ʾnn*	[15] εὑρισκόμεθα
	dʿmy :. [11] *ʾyṭʾ*	σὺν ἐμοί. [11] εἴτε	*dy ʾwp*	δὲ καὶ
	ʾwn ʾnʾ ʾyṭʾ	οὖν ἐγὼ εἴτε	*sḧdyn dg̈lyn*	ψευδομάρτυρες
	hlyn : *kdn*	ἐκεῖνοι, οὕτως	*ʿl ʾlhʾ*	τοῦ θεοῦ,
	ʾnn mkr̈zyn .	κηρύσσομεν	*dʾs̈ydnn*	ὅτι ἐμαρτυρήσαμεν
10	*wkdn hymntwn* :.	καὶ οὕτως ἐπιστεύσατε.	*ʿl ʾlhʾ*	κατὰ τοῦ θεοῦ
	✣[12] *ʾn dy mšyḥʾ*	[12] Εἰ δὲ Χριστὸς	*dʾqym*	ὅτι ἤγειρεν
	mtkrz dqm	κηρύσσεται ὅτι	*mšyḥʾ mn*	τὸν Χριστόν, ὃν
	mn byn myẗyʾ	ἐκ νεκρῶν ἐγήγερται,	*dlʾ ʾqym* :.	οὐκ ἤγειρεν
	hyk ʾnš̈yn	πῶς	*ʾn mÿtyn*	εἴπερ ἄρα[106] νεκροὶ
15	*byntkwn* :	λέγουσιν ἐν ὑμῖν	✣*lʾ qm̈yn*	οὐκ ἐγείρονται.

[103] Not in Gk.
[104] Omitted in Christian Palestinian Aramaic.
[105] Omitted in Christian Palestinian Aramaic.
[106] Omitted in Christian Palestinian Aramaic.

	ʾmr̈yn dlyt	τινες ὅτι ἀνάστασις	[16] *ʾn dy myẗyn*	[16] εἰ γὰρ[107] νεκροὶ
	qymʾ lmÿtyn :.	νεκρῶν οὐκ ἔστιν;	*lʾ qm̈yn*	οὐκ ἐγείρονται,
	✣[13] *ʾn dy lyt*	[13] εἰ δὲ ἀνάστασις	*ʾwp lʾ*	οὐδὲ
	qymʾ lmÿtyn :	νεκρῶν οὐκ ἔστιν,	*mšyḥʾ lʾ*	Χριστὸς
20	*ʾwp*[108] *lʾ mšyḥʾ*	οὐδὲ Χριστὸς	*qm* :. [17] *ʾn dy*	ἐγήγερται· [17] εἰ δὲ
	lʾ qm :. [14] *ʾn dy*	ἐγήγερται· [14] εἰ δὲ	*mšyḥʾ lʾ*	Χριστὸς οὐκ
	mšyḥʾ lʾ qm	Χριστὸς οὐκ ἐγήγερται	*qm* :.	ἐγήγερται,

5.6.2 Sin. syr. NF M38N, f. 6v – 1 Corinthians 15:17b–24a

1	*dyhʾ hy*	ματαία ἡ	*dhlyn ddm̈kw* :.	τῶν κεκοιμημένων.
	hymnwtkwn	πίστις ὑμῶν[109],	✣ [21] *lbdyl gr*	[21] ἐπειδὴ γὰρ
	ryqnʾ ʾwp		*dbtr lbrnš*	δι᾽ ἀνθρώπου
	ʾkrzwtn[110] : *ʿd*	ἔτι	*mwtʾ*	θάνατος,
5	*kdw ʾtwn*	ἐστὲ ἐν ταῖς	*wbtrʿ brnš*	καὶ δι᾽ ἀνθρώπου
	bsklïkwn :.	ἁμαρτίαις ὑμῶν,	*qyʾmtʾ*	ἀνάστασις
	[18] *ʾrʾ ʾwp*	[18] ἄρα καὶ	*dmÿtyʾ* :.	νεκρῶν.
	hlyn ddm̈kw	οἱ κοιμηθέντες	[22] *ḥyk mʾ gr*	ὥσπερ γὰρ
	bmšyḥʾ	ἐν Χριστῷ	*dbʾdm*	[22] ἐν τῷ Ἀδὰμ
10	*ʾb̈dw* :. [19] *ʾn*	ἀπώλοντο. [19] εἰ	*kwlʾ mm̈tyn*	πάντες
		ἀποθνῄσκουσιν,		
	bhlyn ḥÿyʾ	ἐν τῇ ζωῇ ταύτῃ	*hkdn ʾwp*	οὕτως καὶ
	blḥwd ʾnn	ἐν Χριστῷ	*mšyḥʾ*	ἐν τῷ Χριστῷ
	mswbr̈yn(sic)[111]	ἠλπικότες	*kwlʾ ḥÿyn* :.	πάντες
		ζῳοποιηθήσονται.		
	bmšyḥʾ :.	ἐσμὲν μόνον,	[23] *kwl ʾnš dy*	[23] ἕκαστος δὲ
15	*ṣr̈ykyn ʾnn*	ἐλεεινότεροι	*bʾtqnwtʾ*	ἐν τῷ ἰδίῳ
	r̈ḥmyn mwtr	πάντων	*dgrmh* : *mn*	τάγματι·
	mn kwlhwn	ἀνθρώπων	*ryš*[112] *mšyḥʾ* :.	ἀπαρχὴ Χριστός,
	bnÿnšʾ :. [20] *kdw*	ἐσμέν. [20] Νυνὶ	*wmn btr kn*	ἔπειτα
	dy mšyḥʾ	δὲ Χριστὸς	*hlyn dhnwn*	οἱ
20	*qm mn byn*	ἐγήγερται ἐκ	*bmšyḥʾ*	τοῦ Χριστοῦ
	mÿtyʾ :	νεκρῶν	*bmytwyth* :	ἐν τῇ παρουσίᾳ αὐτοῦ,
	trwmthwn	ἀπαρχὴ	[24] *wbkn šyṣwyʾ* :.	[24] εἶτα τὸ τέλος

[107] In Christian Palestinian Aramaic δέ.
[108] Christian Palestinian Aramaic + καὶ.
[109] Christian Palestinian Aramaic + ἐστιν.
[110] Christian Palestinian Aramaic + καὶ τὸ κήρυγμα ἡμῶν Tischendorf, *Novum Testamentum Graece*, 564.
[111] In Christian Palestinian Aramaic *msbr̈yn* is expected instead.
[112] While verse 20 has *trwmthwn*, verse 23 shows *ryšʾ* and *ryšḥ* 1 Cor 16:15 for the first part of the expected compound as in [*ry*]*šw dtrwmtʾ* Cyril XVII 9 (CCPA V 191).

5.7.1 Sin. syr. NF M38N, f. 2r – 1 Corinthians 16:3b–10a

1	*bdq̈yn bʾgr̈n*	δοκιμάσητε, δι’	[7] *lyt ʾnʾ gr*	[7] οὐ θέλω γὰρ
	lhlyn ʾnʾ	ἐπιστολῶν τούτους	*ṣbʾ kdw*	ὑμᾶς ἄρτι ἐν
	mšlḥ dyẅblwn	πέμψω ἀπενεγκεῖν	*dyḥmynkwn*	παρόδῳ
	ḥysdkwn	τὴν χάριν ὑμῶν	*mn ʿbr* :.	ἰδεῖν,
5	*lyrwšlm* :	εἰς Ἰερουσαλήμ·	*mswbr ʾnʾ*	ἐλπίζω
	[4] *ʾn dy hwʾ*[113]	[4] ἐὰν δὲ ἄξιον	*gr dʾšwn*	γὰρ χρόνον
	šwʾ dʾwp	ᾖ τοῦ κἀμὲ	*dkdn yktr*	τινὰ ἐπιμεῖναι
	ʾnʾ yʾzl	πορεύεσθαι,	*lwtkwn ʾn*	πρὸς ὑμᾶς ἐὰν
	ʿmy hnwn	σὺν ἐμοὶ	✣ *yšlṭ mrʾ* :.	ὁ κύριος ἐπιτρέψῃ
10	*ʾz̈lyn* :. [5] *ʾtʾ*	πορεύσονται.	[8] *mktr ʾnʾ dy*	[8] ἐπιμενῶ δὲ
		[5] Ἐλεύσομαι		
	ʾnʾ dy lwtkwn	δὲ πρὸς ὑμᾶς	*bʾpsws*	ἐν Ἐφέσῳ
	kd yʿbwr	ὅταν Μακεδονίαν	*ʿd mṭ̇*	ἕως τῆς
	lmqdwnyʾ :.	διέλθω·	*Pnṭyqwsṭ̇* :.	πεντηκοστῆς·
	lmqdwnyʾ	Μακεδονίαν	[9] *trʿgr rb*	[9] θύρα γὰρ μοι
15	*gr ʾnʾ ʿbr* :.	γὰρ διέρχομαι,	*ʾtpṭḥ ly* :	ἀνέῳγεν μεγάλη
	[6] *lwtkwn dy*	[6] πρὸς ὑμᾶς δὲ	*wmʿml*	καὶ ἐνεργής,
	ṭkʾ ʾnʾ	τυχὸν	*wmzdq̈pnyn*	καὶ ἀντικείμενοι
	mktr : ʾ ̇	παραμενῶ ἢ	*sgy* :. [10] *ʾn*	πολλοί. [10] Ἐὰν
	ʾwp msẗ :	καὶ παραχειμάσω,	*dy yʾẗ*	δὲ ἔλθῃ
20	*dʾtwn*	ἵνα ὑμεῖς	*ṭymytyws* :	Τιμόθεος,
	tšlḥwny	με προπέμψητε	*ḥm̈w dlʾ bdḥlʾ*	βλέπετε, ἵνα ἀφόβως
	lhn dʾnʾ ʾzl :.	οὗ ἐὰν πορεύωμαι.	*yhʾ lwtkwn* :.	γένηται πρὸς ὑμᾶς·

5.7.2 Sin. syr. NF M38N, f. 2v – 1 Corinthians 16:10b–16a (Fig. 3)

1	*ʿwbdh gr*	τὸ γὰρ ἔργον	[13] *ʾtʿyr̈w*	[13] Γρηγορεῖτε,
	dmrʾ hw	κυρίου	*dy wqẅm:w*	[δὲ] στήκετε
	ʿml hyk	ἐργάζεται ὡς	*bhymnwtʾ* :.	ἐν τῇ πίστει,
	dʾnʾ :. [11] *ʾnš*	κἀγώ· [11] μή τις	*ʾtgbr̈w* :	ἀνδρίζεσθε,
5	*ʾwn lʾ*	οὖν αὐτὸν	*wʾštr̈w* :	κραταιοῦσθε.
	ypswlnh :.	ἐξουθενήσῃ.	[14] *kwl mʾ*	[14] πάντα
	šlḥ dy lhdn	προπέμψατε δὲ αὐτὸν	*dlkwn bḥbʾ*	ὑμῶν ἐν ἀγάπῃ
	bšylm : *lbdyl*	ἐν εἰρήνῃ, ἵνα	✣ *yth mtʿbd* :.	γινέσθω.
	dyt [sic] *lwty*	ἔλθῃ πρός με·	[15] *bʿ ̇ ʾnʾ dy*	[15] παρακαλῶ δὲ
10	*msk̇ ʾnʾ*	ἐκδέχομαι	*mnkwn ʾḫyʾ* :	ὑμᾶς, ἀδελφοί·
	lh gr ʿm	γὰρ αὐτὸν μετὰ	*mkr̈yn ʾtwn*	οἴδατε τὴν
	ʾḫyʾ :. [12] *ʿlṭb*	τῶν ἀδελφῶν. [12] Περὶ	*byth*	οἰκίαν

[113] The scribe overwrote the verb *mḥʾ* ‘to hit, strike’ with *hwʾ*.

	dy ʾPwlwn	δὲ Ἀπολλῶ	*dʾspnws*(sic)[114]	Στεφανᾶ,
	ʾḥwnn : *sgy*	τοῦ ἀδελφοῦ	*wdpwrṭyws*(sic)[115] :	ὅτι ἐστὶν
15	*bʿyt mnh*	πολλὰ παρεκάλεσα	*dhw ryšḥ*	ἀπαρχὴ
	dyʾtʾ lwtkwn	αὐτόν, ἵνα ἔλθῃ πρὸς	*dʾkʾyʾ* :	τῆς Ἀχαΐας
	hlyn ʾḫyʾ :.	ὑμᾶς μετὰ τῶν ἀδελφῶν·	*wltšmyšʾ*	καὶ εἰς διακονίαν
	wPnṭws lʾ	καὶ πάντως οὐκ ἦν	*dqdÿšyʾ*	τοῖς ἁγίοις
	hwʾ ṣbywn	θέλημα	*ʾtq̈nw*	ἔταξαν
20	*dkdw yʾtʾ* :.	ἵνα νῦν ἔλθῃ,	*grmhwn*[116] :.	ἑαυτούς·
	ʾtʾ hw dy	ἐλεύσεται δὲ	[16] *dʾwpn*(sic)[117]	[16] ἵνα καὶ
	kd ʾštwʾ :.	ὅταν εὐκαιρήσῃ.	*ʾtwn thwn*	ὑμεῖς ὑποτάσσησθε

5.8.1 Sin. syr. NF M38N, f. 3r – 2 Corinthians 2:11c–17a

1	*dyšl lh wlʾ*	τὰ νοήματα	*mpwlʾ ln*	ἡμᾶς
	⌜*ydʿ*nn⌝ *lh* :.	ἀγνοοῦμεν.	*bysws*	ἐν τῷ
	[12] *kd dy ʾtyt*	[12] Ἐλθὼν δὲ	*mšyḥʾ* : *wryḥʾ*	Χριστῷ καὶ τὴν ὀσμὴν
	lṭrwʾs	εἰς τὴν Τρῳάδα	*dʾkrwth*	τῆς γνώσεως αὐτοῦ
5	*bbswrh*	εἰς τὸ εὐαγγέλιον	*mngd btrʿn*	φανεροῦντι δι᾽ ἡμῶν
	dmšyḥʾ :	τοῦ Χριστοῦ	*bkwl ʾtr* :.	ἐν πάντι τόπῳ·
	wtrʿ	καὶ θύρας	[15] *dʾnn ryḥh*	[15] ὅτι Χριστοῦ
	ʾtptḥ ly	μοι ἀνεῳγμένης	*bsymʾ*	εὐωδία
	bmrʾ : [13] *lʾ*	ἐν κυρίῳ, [13] οὐκ	*dmšyḥʾ*	ἐσμὲν
10	*hwʾ ly*	ἔσχηκα	*bʾlhʾ* : *bhlyn*	τῷ θεῷ
	nyḥ lrwḥy	ἄνεσιν τῷ πνεύματί μου	*dḫ̈yyn* : *wbhlyn*	ἐν τοῖς σῳζομένοις καὶ ἐν τοῖς
	lbdyl dlʾ	τῷ μὴ	*dʾb̈ydyn* :.	ἀπολλυμένοις,
	ʾškḥyt	εὑρεῖν με	[16] *lʾn̈šyn mn*	[16] οἷς μὲν
	lṭyṭws	Τίτον τὸν	*ryḥ dmwt*	ὀσμὴ ἐκ θανάτου
15	*ʾḥy* : *ʾlʾ*	ἀδελφόν μου, ἀλλὰ	*lmwt* :	εἰς θανάτον,
	ʾtšyryt[118]	ἀποταξάμενος	*wlʾn̈šyn*[119] *mn*	οἷς δὲ
	mnhwn :	αὐτοῖς	*ryḥ dḫ̈yyn*	ὀσμὴ ἐκ ζωῆς
	wnpqyt	ἐξῆλθον	*lḫ̈yyn* : *wlqwbl*	εἰς ζωήν, καὶ πρὸς
	✣ *lmqdwnyʾ* :	εἰς Μακεδονίαν.	*lhlyn mn*	ταῦτα
20	[14] *ṭybwtʾ dy*	[14] Τῷ δὲ θεῷ	✣ *dwmlʾy* :.	τίς ἱκανός;

[114] The *ṭet* in *ʾspnws* was omitted by the scribe.

[115] The additional name *pwrṭyws* is incorrectly spelled and stands for *pwrṭwnṭws*; see verse 17 in Greek. According to Tischendorf, *Novum Testamentum Graece*, 566 the sources d, e, am, fu, harl, cop, arm, Thdrt, Dam, Ambrst add και Φορτουνατου.

[116] *ʾtq̈nw grmhwn* belongs before *wltšmyšʾ* from a syntactical point of view.

[117] *ʾwpn* < **ʾwp ʾn*?. Usually *ʾwp* is merged with the independent pronoun *ʾn*, see Müller-Kessler, *Grammatik des Christlich-Palästinisch-Aramäischen*, 68, 148.

[118] Gk ἀποταξάμενος from ἀποτάσσω ‘to say farewell’; cf. also *ytšyr* Luke 9:61 ἀποτάξασθαι.

[119] Gk δέ.

	lʾlhʾ : *lhdn*	χάρις τῷ	[17] *lyt ʾnn gr*	[17] οὐ γάρ ἐσμεν
	dbkwl ṣd	πάντοτε θριαμβεύοντι	*hwyn sgy*	ὡς οἱ πολλοὶ

5.8.2 Sin. syr. NF M38N, f. 3v – 2 Corinthians 2:17b–3:5a

1	*mnkl̈yn mlth*	καπηλεύοντες τὸν λόγον	*wmtqr̈yʾ*	καὶ ἀναγινωσκομένη
	dʾlhʾ : *ʾlʾ*	τοῦ θεοῦ, ἀλλ’	*mn kwlhwn*	ὑπὸ πάντων
	hyk dmn	ὡς ἐξ	*bnyr̈šʾ* :.	ἀνθρώπων,
	dkyw[120] : *ʾlʾ*	εἰλικρινείας, ἀλλ’	[3] *mtnkr̈yn*	[3] φανερούμενοι
5	*hyk dmn*	ὡς ἐκ	*dʾtwn*	ὅτι ἐστὲ
	ʾlhʾ . qwdm	θεοῦ κατέναντι	*ʾgrth*[121]	ἐπιστολὴ
	ʾlhʾ dmšyḥʾ	θεοῦ ἐν Χριστῷ	*dmšyhʾ*	Χριστοῦ
	ʾnn mm̈llyn :.	λαλοῦμεν.	*dʾštmšṫ*	διακονηθεῖσα
	[3:1] *mšr̈yn ʾnn*	[3:1] Ἀρχόμεθα πάλιν	*mnn* :. *wktybʾ .*	ὑφ’ ἡμῶν,
		ἑαυτοὺς		ἐγγεγραμμένη
10	*twbn mqÿmyn*	συνιστάνειν;	*lʾ bmlwn* :	οὐ μέλανι
	grm̈n :. ʾ ;	ἢ	*ʾlʾ brwhh*	ἀλλὰ πνεύματι
	dmʾ ṣr̈ykyn	μὴ χρῄζομεν	*dʾlhʾ ḥyʾ* :.	θεοῦ ζῶντος,
	ʾnn hyk	ὥς τινες	*lʾ blẅḥyn*	οὐκ ἐν πλαξὶν
	dʾn̈šyn ʾgr̈n	συστατικῶν ἐπιστολῶν	*dkyp . ʾlʾ*	λιθίναις ἀλλ’
15	*dqdẅmyn*	πρὸς	*blẅḥyn dlb*	ἐν πλαξὶν καρδίαις
	lwtkwn . ʾ ;	ὑμᾶς ἢ	*dbsr* :.	σαρκίναις.
	mnkwn :.	ἐξ ὑμῶν;	[4] *rḥṣwn dy*	[4] Πεποίθησιν δὲ
	[2] *ʾgrtn dyln*	[2] ἡ ἐπιστολὴ	*dkdn ʾyt*	τοιαύτην ἔχομεν
	ʾtwn hnwn :	ἡμῶν ὑμεῖς	*ln btrʿ*	διὰ
20	*bktybʾ*	ἐστε, ἐγγεγραμμένη	*mšyhʾ lwt*	τοῦ Χριστοῦ πρὸς
	dlbb̈ynn .	ἐν ταῖς καρδίαις ἡμῶν,	*ʾlhʾ* :. [5] *lʾ*	[5] τὸν θεόν. οὐχ
	‡[122] *wmtnkrʾ*[123] .	γιγνωσκομένη	*dmn grm̈n* ‡	ὅτι ἀφ’ ἑαυτῶν

[120] Cf. *ddkyw* ‘purity’ 1 Cor 5:8 CCR2B [Syr. NF M38N]; *bdkyw* 2 Cor 6:6 CCR2B (CCPA IIB 99).

[121] *ʾgrtʾ* [T-S 20.157, f. 1r].

[122] ‡ ... ‡ also attested in Christian Palestinian Aramaic from the Cairo Genizah [T-S 20.157, f. 1r], see Müller-Kessler and Sokoloff, *The Christian Palestinian Aramaic New Testament Version*, 103. The underlined words agree with the T-S version.

[123] *wmtydʿʾ* [T-S 20.157, f. 1r].

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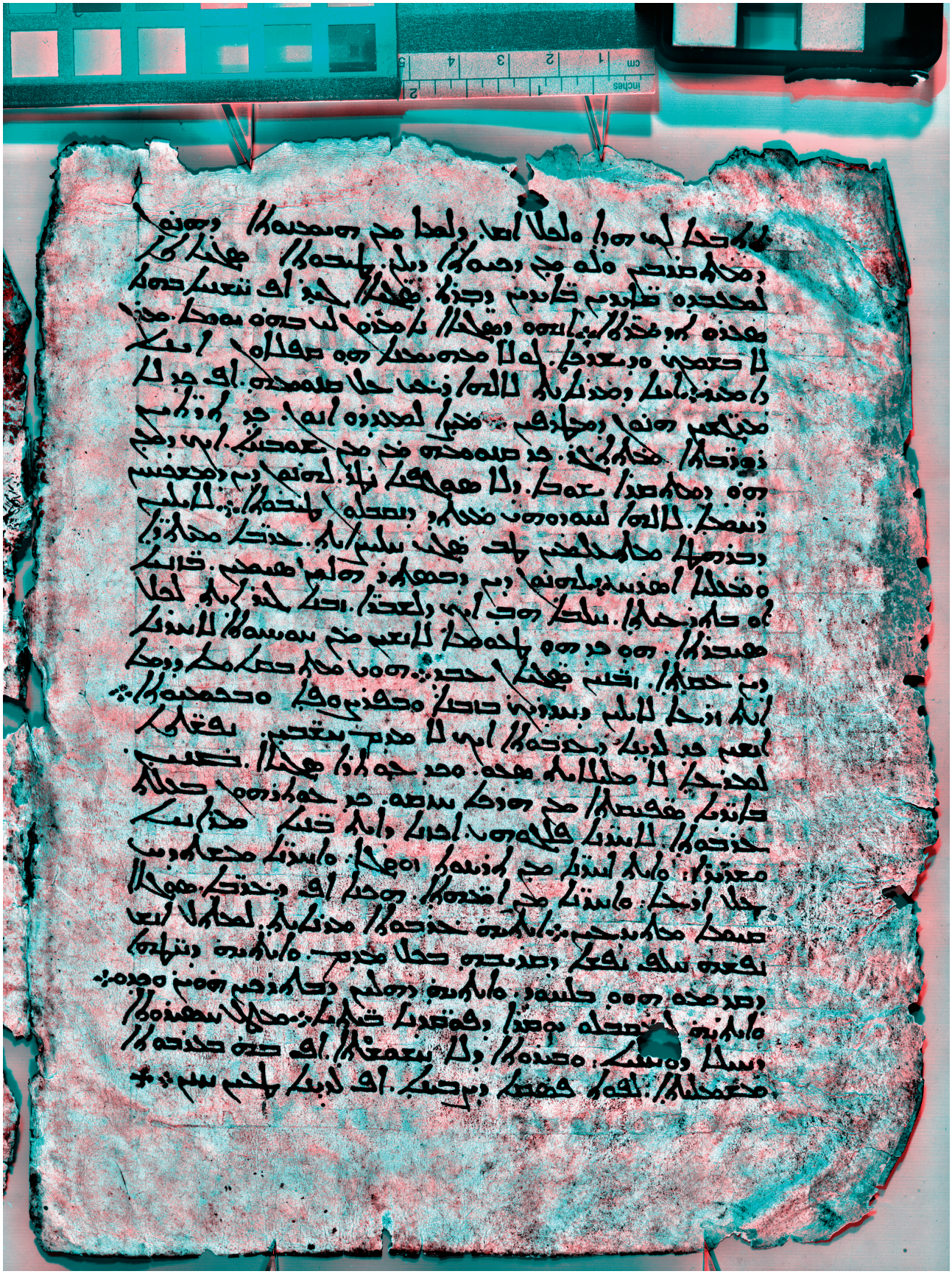

Fig. 1: Sin. syr. NF M38N, f. 1v – 1 Corinthians 2:15b–3:5a
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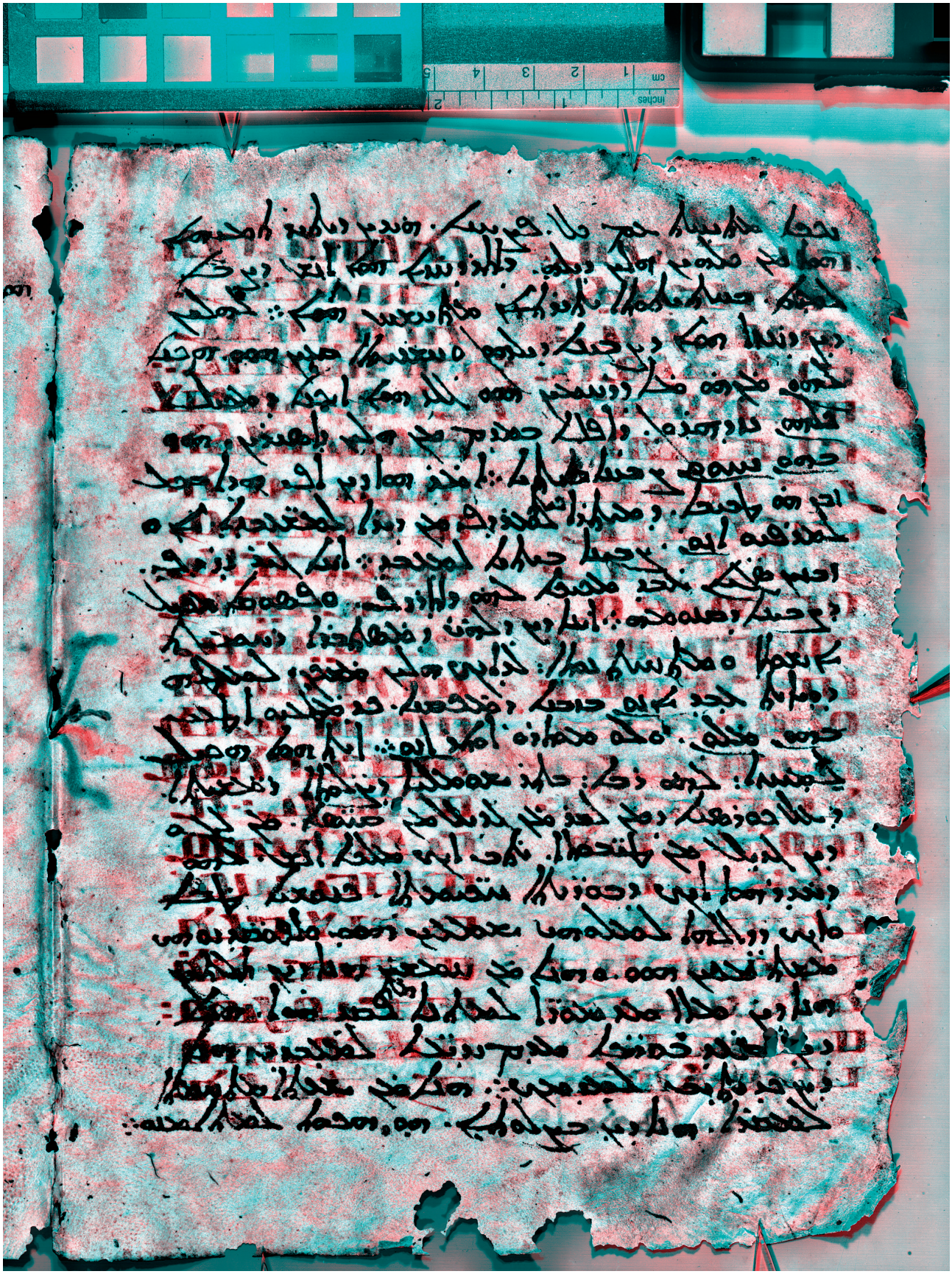

Fig. 2: Sin. syr. NF M38N, f. 7v – 1 Corinthians 14:20b–24a
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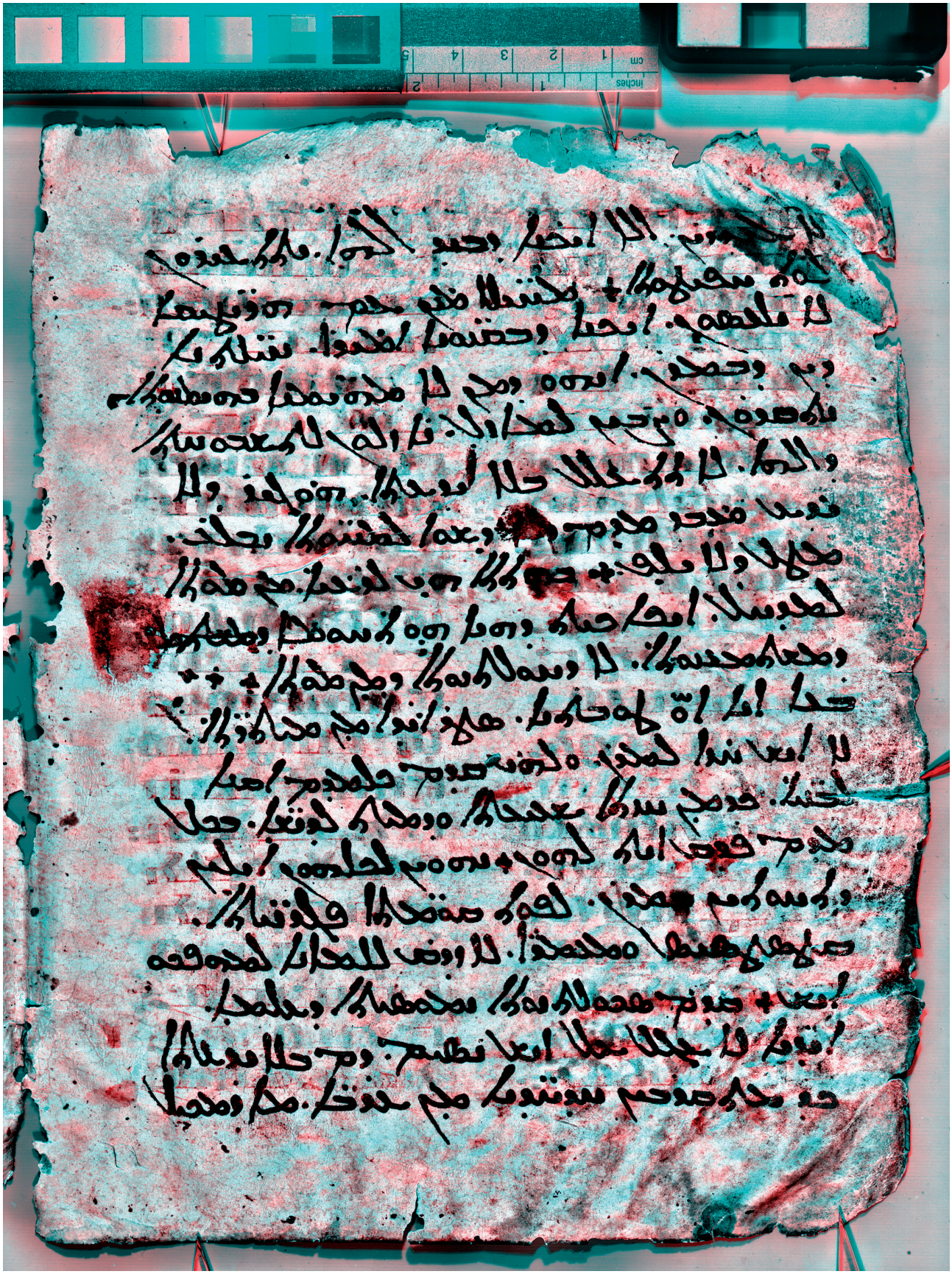

Fig. 3: Sin. syr. NF M38N, f. 2v – 1 Corinthians 16:10b–16a
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Découvertes importantes dans des manuscrits palimpsestes du Sinaï : CPA NF Fragment 16, Géo. NF 84–90 et Syr. NF Fragment 76*

Abstract: We give below the most important results of our work of deciphering Armenian and Georgian palimpsests kept in the Holy Monastery of St. Catherine on Mount Sinai, Egypt, for the Sinai Palimpsests Project. The second fragment of CPA NF Fragment 16 seems to have been washed (the first fragment is not palimpsest). In fact, the CPA fragment is the palimpsest undertext (7th century?) and what appears today as the palimpsest layer is the end of a Georgian manuscript (10th century), which is in fact the upper layer: something probably unique, when the undertext appears as the uppertext!

Sin. geo. NF 84 and NF 90, two fragmentary pieces of the same manuscript, are a double palimpsest, both layers in Georgian; the older layer is largely part of a khanmeti mravaltavi (homiliary/panegyrikon) from the 6th century; it is different from the already known fragments of Georgian mravaltavi. The intermediate layer is a heavily mixed *khanmet'i/haemet'i* Psalter (end of the 7th–beginning of the 8th century). This mixing of languages had been hitherto unknown.

Sin. syr. NF Fragment 76 gives us an extract of the *Life of St. Antony* by Athanasius in Armenian erkatagir (7th–8th century?); it is the earliest fragment known today.

All these decipherings are absolutely new and were possible only within the framework of the Sinai Palimpsests Project. They shed more light on the books used quite early by the monks in Palestine and on Mount Sinai, mainly books of various liturgical and ascetical contents.

C'est une merveilleuse aventure que de pouvoir déchiffrer des couches inférieures d'écriture en utilisant une méthode qui n'endommage aucunement les manuscrits. Je n'oublierai jamais le choc ressenti lorsque, il y a quelque quarante ans, voulant travailler sur le manuscrit géorgien 5 de la Bibliothèque nationale de France, je découvris les traces irrémédiables laissées par les réactifs chimiques utilisés au XIXe siècle dans les premières tentatives de déchiffrement.

Je présenterai ici seulement trois manuscrits dont la contribution à une meilleure connaissance de la littérature chrétienne ancienne, arménienne et géorgienne, dans la Palestine et au Monastère de Sainte-Catherine du Sinaï, me paraît importante.

I

Le premier exemple est le fragment Sin. CPA NF Fragment 16 en Araméen christo-palestinien. Il a été décrit par Sebastian Brock dès 1995 et consiste en deux fragments de feuillets : le haut d'un feuillet (il s'agissait d'un manuscrit copié sur deux colonnes) et le fragment d'une colonne interne.[1] Le manuscrit n'est pas signalé comme palimpseste dans la description, mais dans la partie du catalogue présentant un choix de reproductions photographiques, le second fragment est bien indiqué comme palimpseste.[2] L'araméen présente un fragment de l'Évangile selon Luc, chapitre 18. Malheureusement, on ne connaît actuellement aucun autre fragment provenant du même manuscrit, que ce soit au Sinaï ou ailleurs. Sebastian Brock le date du VIIe siècle, mais écrit très

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1 Brock, *Catalogue of Syriac Fragments*, XLIV et 90–91.

2 Brock, *Catalogue of Syriac Fragments*, 312, fig. 444 et 445.

sagement : « the dates given to the fragments … are very tentative ».[3] Ce fragment, le feuillet 2, étant présenté comme palimpseste, j'ai cherché à déchiffrer la couche inférieure, en tournant le feuillet de 90° dans le sens inverse des aiguilles d'une montre.

Le texte est en *nusxuri* géorgien. Il contient des indications de lectures liturgiques, puis Luc 24:24–31 lecture incomplète au commencement et à la fin, et enfin le commencement du mémorial de copie. Le manuscrit a été copié par le scribe Gabriel au monastère du Mont Sinaï – l'écriture est datable du troisième tiers du xe siècle. Dali Chitunashvili a fait remarquer qu'il ne s'agit pas du scribe du manuscrit Sin. geo. 16, clairement mal daté par Gérard Garitte, suivant une mauvaise lecture de Tsagareli ;[4] ce manuscrit est des années 1070 et a été copié au monastère de la Croix à Jérusalem.[5] Malheureusement, notre fragment est incomplet et la date de copie n'est pas conservée, mais la main du copiste peut certainement être datée du troisième tiers du xe siècle. Alors, si l'on regarde la photo du catalogue, il semble clair que le texte supérieur est l'araméen : mais Sebastian Brock indique que le feuillet pourrait avoir été lavé.[6] Apparemment, c'est la couche supérieure, le géorgien, qui a le plus souffert de cette opération, au point de sembler être la couche inférieure: un cas de figure unique, à ma connaissance – puisqu'il est évidemment exclu qu'un texte du viie (possiblement viiie siècle, selon l'avis d'Alain Desreumaux)[7] recouvre un texte de la fin du xe siècle !

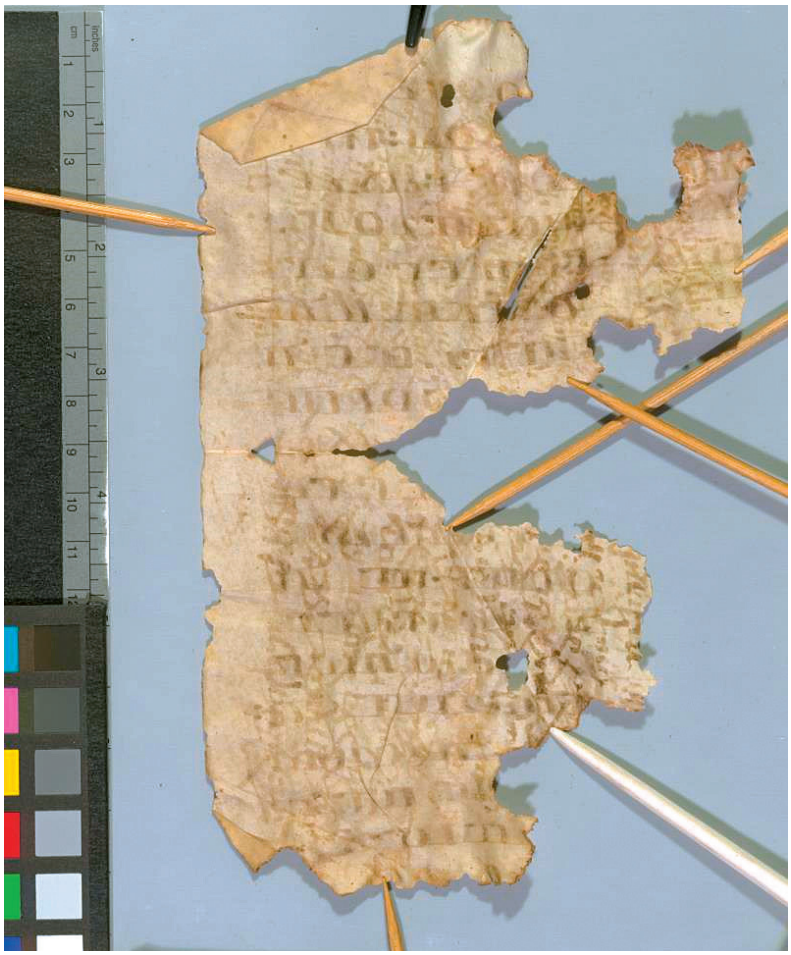

Fig. 1 : Sin. CPA NF frg. 16, f. 2v (CPA)
(© St. Catherine's Monastery, Sinai, Egypt)

[3] Brock, *Catalogue of Syriac Fragments*, XXVII.
[4] Communication orale pendant la conférence.
[5] Garitte, *Catalogue des manuscrits géorgiens*, 49 et 53.
[6] Brock, *Catalogue of Syriac Fragments*, 90.
[7] Communication orale pendant la conférence.

En tout cas, nous avons ici un scribe Gabriel, à la fin du x^e siècle, au Sinaï. Voici ce que l'on peut déchiffrer du mémorial de copie :

ⵝⵛⵣⵜⴆⵓⵄⵛ ⵞ[ⵛⵞⵑ]	Au nom du Pè-
ⵏⴑⵘⴰⵏ ⵙⴑ ⵘⵔⵏⴑⵘ[ⴰⵏ]	re et du Fils
ⵙⴑ ⵏ˜ⴰⵔⵏ ⵜ˜ⵙⵔⵏⴑⵘ[ⴰⵏ]	et du Saint-Esprit
ⵘⵔⴰⵣⵔⵣⴰⵏ ⵜ˜ⵔⵏ ⵔ[ⴰⵔⵏ]	avec l'intercession de la sainte Mère
ⵘⵢ˜ⵣⴰⵔⵏⴑⵘⴰⵏ : ⵙⴑ ⵜ˜ⴰⵏ	de Dieu et des saints
ⵘⴰⵏⴑⵜ˜ⵗ ⴑⵀⵣⵔⴰ˜ⴆⴰ˜ⵘⴰⵏ	archanges
ⵙⴑ ⵜ˜ⵔⵏ ⵔ˜ⵀⵎ ⵀ˜ⴰⵔⴰⵗ˜ⵔⵗⵘⴰⵏ	et de saint Jean Baptiste
ⵙⴑ ⵜ˜ⴰⵏ ⵘⴑⵣ˜ⵗⵢⵣⵔⴰⵏⵘⴰⵏ	et des saints évangélistes
ⵘⴑⴰ ⵘⵗⵀⴆ ⵔⴰⵛⵀⴑ ⵙⴑ ⵔⵘ	Matthieu Marc Luc et Je-
ⵜⵏⵀⵎⵗⵔⴰⵏ ⵙⴑ ⵜ	an et de s(aint)
ⵘⴰⵗⵎ ⵙⵔⵙⵔⵗⵏ ⵙⴑ	Moïse le Grand et
ⵎⵔⴰⵏ ⵜ˜ⵏ	de tous les saints
ⵘⵔⴰⵣⵔⵣ	avec l'interces(sion et la)
ⵔ[ⴰ]ⵏⵜⵔⵔⴰⵏ	prière
. ⵎ ⵍⵀⵍⴆ ⵚⵙ ⵒ˜ⵙⵜ	moi, G(a)b(rie)l très péch(eur)

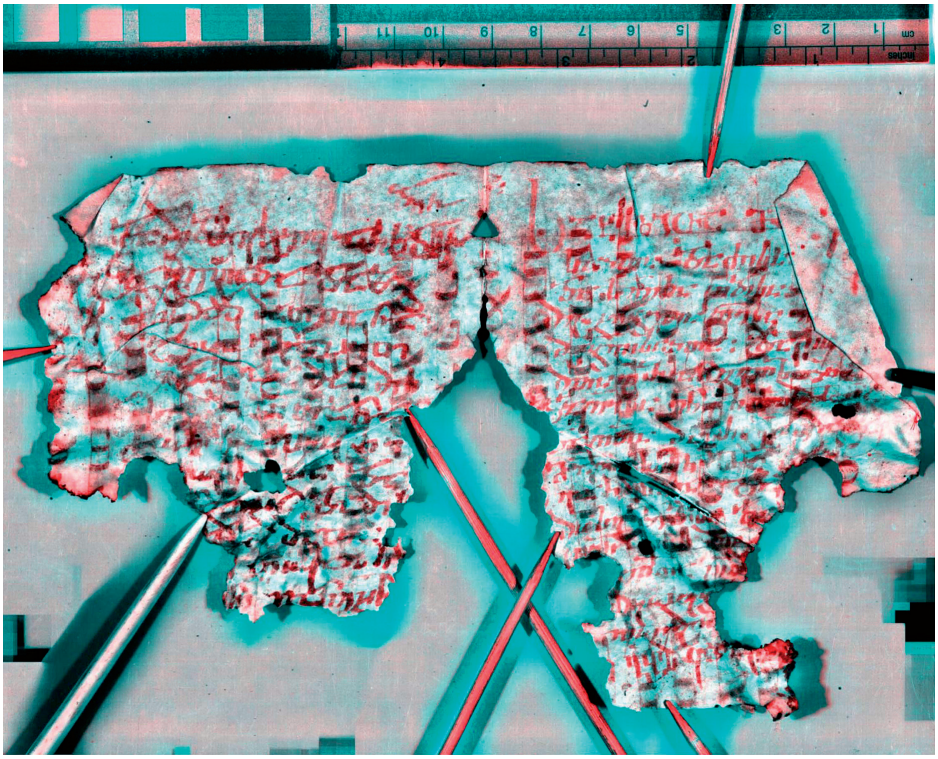

Fig. 2 : Sin. CPA NF frg. 16, f. 2v (Georgian)
(© St. Catherine's Monastery, Sinai, Egypt)

Nous avons un colophon de Ioane Zosime, daté de 978 (Sin. geo. 15), qui a tous ces éléments ;[8] de même, de l'an 979, le manuscrit Sin. geo. 30–38 :[9] l'origine sinaïtique du manuscrit ne saurait être mise en doute. Il restera à examiner si on peut trouver un ou d'autres manuscrits attribuables à ce nouveau scribe au Sinaï, jusqu'ici inconnu : Gabriel.

II

Le deuxième manuscrit que je voudrais signaler est le manuscrit Sin. geo. NF 84 et geo. NF 90 : ces 45 (7 + 38) feuillets faisaient partie du même manuscrit, comme il a été justement proposé dans le catalogue sous le n° 84 : « On the basis of palaeographic evidence, it seems likely that the leaves belong to Sin. Geo. N 90 ».[10]

Ces fragments sont doublement palimpsestes, ils comportent donc trois couches d'écriture, toutes les trois géorgiennes. La couche supérieure a été étudiée par nous ailleurs.[11] Les deux couches inférieures sont en majuscules.

À réception des photos, j'ai pu rapidement identifier les deux couches inférieures ; puis mon collègue Jost Gippert reçut aussi les photos : il confirma les identifications et améliora grandement le déchiffrement ; il a choisi de communiquer sur les palimpsestes albaniens, mais cette partie doit être considérée comme commune à nous deux.

Rappelons que nous ne connaissons pas, actuellement, de manuscrit géorgien daté explicitement avant l'an 864.[12] Mais une particularité de l'histoire de la langue géorgienne nous vient en aide pour suppléer à ce problème paléographique : en effet, au XX^e^ siècle ont été découverts des manuscrits (pour la plupart des palimpsestes) et des inscriptions lapidaires qu'on peut supposer dater des V^e^–VIII^e^ siècles, parce qu'ils contiennent un infixe essentiellement verbal qui a disparu dès le IX^e^ siècle : *khan* (la lettre ბ) et *hae* (la lettre ჱ), d'où les termes *khanmet'i* (avec *khan* en plus) et *haemet'i* (avec *hae* en plus) qui caractérisent les textes de l'époque entre le début de l'alphabétisation des Géorgiens aux IV^e^–V^e^ siècles et la langue standardisée géorgienne ancienne du IX^e^ siècle. On admet, en se basant sur les inscriptions, que les textes *khanmet'i* datent des V^e^–VII^e^ siècles, et les textes *haemet'i* du VIII^e^ siècle.

La couche inférieure est tirée de trois manuscrits : on lit d'abord l'Évangile selon Matthieu, *khanmet'i*, de 6.31 à 8.3 (Sin. geo. NF 90, ff. 20r–37v) selon la « protovulgate ». Une partie de ces versets n'est pas présente dans la publication classique de Lamara Kadjaia.[13] Il faut signaler que Jost Gippert a identifié un troisième témoin manuscrit dans un autre double palimpseste à Iviron, Mont Athos.[14]

Il y a encore un autre texte *khanmet'i*, provenant d'un homéliaire (en géorgien : *mravaltavi*) : il s'agit d'une homélie pour la Nativité, attribuée en géorgien, mais parfois aussi en grec, à Athanase d'Alexandrie, mais qui doit appartenir à Jean Chrysostome (*CPG* 4560, et 2270 pour Athanase) ; elle a été éditée dès 1944 par Ilia Abuladze d'après deux *mravaltavi* toujours inédits dans leur totalité,[15] puis par Akaki Shanidze dans l'édition du manuscrit sinaïtique de l'an 864.[16] Un point intéressant : notre fragment confirme quelques mots omis dans l'Homéliaire de 864, mais présents dans les deux autres manuscrits du X^e^ siècle : le plus ancien manuscrit n'est pas toujours celui qui conserve le meilleur texte ! L'homélie se lit en Sin. geo. NF 84, ff. 1–5 et geo. NF 90, ff. 19–22, 25 et 28–29. On ne connaissait pas jusqu'à présent de forme *khanmet'i* de cette traduction en géorgien. Un fragment palimpseste d'un autre homéliaire *khanmet'i* a été publié : il provient d'un autre manuscrit.[17]

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[8] Garitte, *Catalogue des manuscrits géorgiens*, 49.
[9] Garitte, *Catalogue des manuscrits géorgiens*, 149–151.
[10] Aleksidze *et al*., *Catalogue of Georgian Manuscripts*, 430.
[11] Outtier, Sinas mtis kartuli.
[12] Voir le récent album : Aleksidze *et al*., *Dated Georgian manuscripts*.
[13] Kajaia, *Khanmet'i t'ekst'ebi*.
[14] Voir le nouveau catalogue des manuscrits d'Iviron, sous presse, manuscrit 86B.
[15] Abuladze, Mravaltavi, 279–288.
[16] Shanidze, *Sinuri mravaltavi 864 c'lisa*, 31–39.
[17] Shanidze, *Khanmet'i mravaltavi*. Voir aussi Gippert, A Homily Attributed to John Chrysostom.

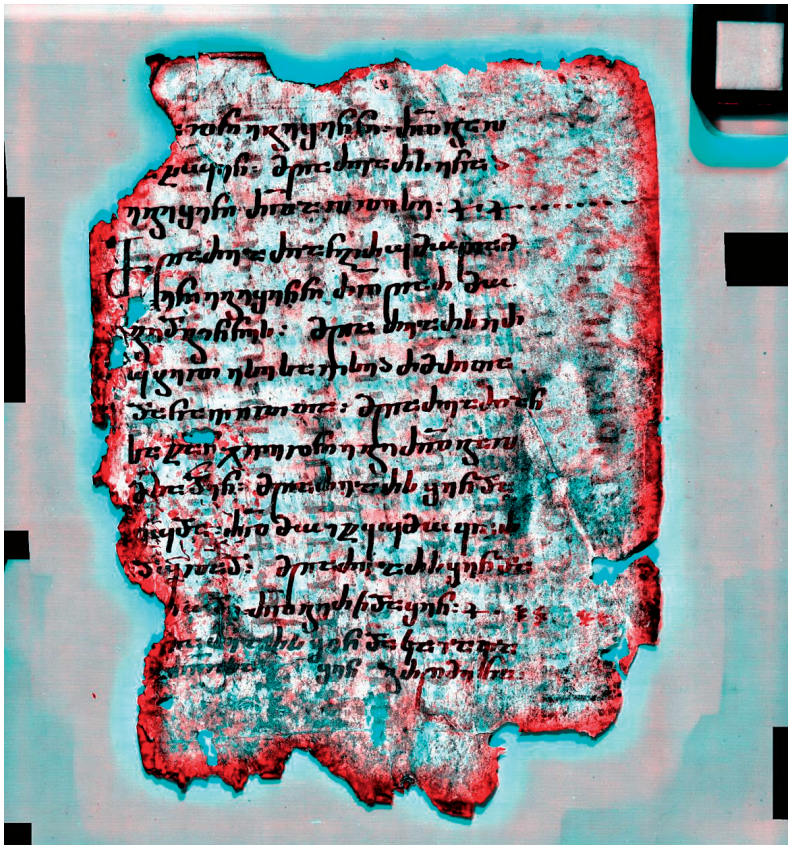

Fig. 3 : Sin. geo. NF 84, f. 1r
(© St. Catherine's Monastery, Sinai, Egypt)

On a aussi un fragment de manuscrit du Psautier. En Géorgie ancienne, le Psautier (avec les Odes) était un livre à part, nécessaire pour les offices quotidiens, et il n'était pas copié dans les manuscrits de l'Ancien Testament.

Notre fragment de Psautier révèle une image unique : on y trouve en effet des formes *khanmet'i* (environ 25 %) et des formes *haemet'i* (75 %) : nous sommes donc ici aux confins des VII^e^ et VIII^e^ siècles. Il y a déjà quelques formes *haemet'i* dans le Lectionnaire *khanmet'i*, généralement daté du VII^e^ siècle ; mais le rapport est très différent : 165 formes *khanmet'i* contre 7 *haemet'i*.[18]

Quant au texte, présent en Sin. geo. NF 84, ff. 6–7, geo. NF 90, ff. 1–3, 5, 7–18, 23–24, 26–27 et 38, il s'agit de la rédaction ancienne commune du Psautier éditée par Mzekala Shanidze,[19] avec quelques variantes, dont certaines communes avec le manuscrit Graz, Universitätsbibliothek 2058/2, provenant du Sinaï. Ce dernier manuscrit est lui aussi palimpseste et la couche inférieure, arménienne – l'Évangile selon Jean avec des *sortes sanctorum*, a récemment été éditée par Erich Renhart.[20] Les titres, comme toujours,[21] font preuve d'une plus grande liberté. Nous avons une large couverture du Psautier, avec des fragments qui vont du Ps 20.10 au Ps 140.8.

Comme souvent, le texte intermédiaire, lorsqu'il y a trois écritures, est le plus difficile à déchiffrer. On peut néanmoins identifier deux textes en majuscules, non *khanmet'i* : le *Martyre de Fébronie* dans une rédaction identique à celle du Sin. geo. 6, qui se trouve dans de nombreux manuscrits,[22] mais est inédite, et deux *Homélies sur la Dormition* attribuées à Jean Chrysostome.[23]

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[18] Shanidze, *Khanmet'i lekcionari*, 23 : Manuscrit Graz, Universitätsbibliothek 2058/1 + Paris, Bibliothèque nationale de France, géorgien 30, f. 1 (cinq formes *khanmet'i* dans le feuillet parisien, à rajouter au compte fait par A. Shanidze, car le feuillet n'avait pas encore été identifié).

[19] Shanidze, *Psalmunis*; Gippert et Outtier, The oldest Georgian Psalter.

[20] Renhart, *Ein spätantikes Los-Buch.*

[21] Voir Shanidze, The Old Georgian Psalter.

[22] Voir Gabidzashvili, *Dzveli kartuli*, 349, n°1118.

[23] Shanidze, *Sinuri mravaltavi 864 c'lisa*, 199–205.

Ces modestes fragments nous restituent bien les lectures monastiques faites en Palestine et au Sinaï par les moines géorgiens : Psaumes et Évangiles, homélies et hagiographie, textes monastiques aussi pour la couche supérieure : Apophtegmes et *Historia monachorum in Aegypto*.

On comprend aussi pourquoi ces textes ont été réutilisés : trois d'entre eux, *khanmet'i* et *haemet'i*, étaient copiés dans un état de langue obsolète ; la stratégie employée pour le *Lectionnaire khanmet'i :* éraser les *khan*, n'a pas été utilisée pour ces textes. L'Homéliaire et la *Vie de Fébronie*, en majuscules eux aussi, ont également été réemployés – mais la *Vie de Fébronie* a été copiée au Sinaï en 981 par Ioane Zosime, en minuscules (*nusxuri*) : manuscrit Sin. geo. 6.

III

Il n'a jamais été signalé de communauté monastique arménienne au Mont Sinaï, même si des pèlerins arméniens ont laissé de nombreux graffiti sur les rochers le long de la route menant au Sinaï.[24] Mais il y avait des monastères arméniens à Jérusalem et des moines arméniens à Saint-Sabas : là, je pense qu'ils furent actifs jusqu'au VIII^e^ siècle. On sait qu'au VII^e^ siècle, l'Église arménienne choisit une formule christologique inspirée par celle de Cyrille d'Alexandrie, contre la définition chalcédonienne et le risque d'être absorbée par les Byzantins. Mais jusque-là, les Arméniens faisaient partie de l'Église universelle – et certains y ont persévéré. Les Arméniens sont les seuls à avoir conservé jusqu'aujourd'hui la liturgie de Jérusalem, certes arménisée. J'ai mentionné plus haut l'Évangile selon Jean avec *sortes sanctorum*, en arménien, récemment édité ; Jost Gippert a édité 42 feuillets palimpsestes en arménien, provenant de deux manuscrits différents, dans la couche inférieure des manuscrits Sin. geo. NF 13 et geo. NF 55.[25]

Le manuscrit Sin. syr. NF Fragment 76 consiste en un unique feuillet, endommagé, de petites dimensions : max 12.5 × 18 cm selon le catalogue de Sebastian Brock.[26] Malheureusement, le texte syriaque a récrit ligne sur ligne, si bien que le texte inférieur arménien en *erkat'agir* n'est pas aisément lisible. Néanmoins, le texte a pu être identifié – je remercie Gohar Muradyan, du Matenadaran Maštoc' d'Erevan de m'avoir fourni le moyen d'identifier le texte[27] – il s'agit d'un fragment de la *Vie d'Antoine* attribuée à saint Athanase. C'est évidemment le plus ancien témoin en arménien de ce texte fondateur pour les moines.

Nous avons ici le ch. 14 (= Tayecʿi, *S. Atʿanasi Ałekʿsandrioy*, p. 549–550 de l'édition du texte arménien) ; il faut lire le verso avant le recto :

f. 1v

եւ ոչ յում[եքէ տեսաւ : Եւ յետ	et il ne fut vu par personne. Et après
այս]որիկ բազու[մք յախտաժետաց	cela, beaucoup d'infirmes
եւ որք նախանձել կամեցան ընդ]	et qui voulaient rivaliser avec
նորա վ[արսն եւ այղոց եւս ծա]	sa conduite et d'autres encore
ն[աւթիցն] որք եկին ե[ւ բռնի զը	de ses connaissances qui étaient venus et
դուրսն] կործանեցին եւ ա[ղաչեցին]	avaient violemment détruit sa porte et le
զնա. եւ [եկն ի դուրս անտոնիոս իբ]	prièrent et Antoine sortit com-
րեւ ուստեք [յանձին ի ներքսական	me des parties internes
կո]ղմանց [խոր]հ[ուրդ բեռեալ]	initié au mystère
զք˜սախրատ. եւ ա˜ծը[նկալ նախ]	du Christ et ayant reçu Dieu
զառաջին յայնժամ [երեւէր]	alors pour la première fois il apparut
նոցա ի բանակետեղ[էն ի դուրս]	à eux, sorti du camp
[ելեալ առ նոսա: նոքա իբրեւ]	vers eux. Eux, quand
տեսին զարմացան. վասն զի	ils (le) virent, furent dans l'admiration, car
տեսին զմարմին. նորա. ի ն[ոյն]	ils virent son corps dans le même
բնութեան եւ ոչ պարարեա[լ]	état et non empâté

[24] Voir Stone, *Armenian Inscriptions from the Sinai*.
[25] Gippert, *Caucasian Albanian Palimpsests*.
[26] Brock, *Catalogue of Syriac Fragments*, 71–72.
[27] Hovhannisyan, *Grabari baṙaran*.

իբրեւ զամերհի. եւ զանկ[իրթ]	comme celui d’un sans exercice
եւ ոչ վատեալ իբրեւ ի պարհ[ոց]	ni affaibli comme par les jeûnes
եւ ի մարտիցն դիւացն այղ [այն]	et les luttes contre les démons, mais
պէս տեսանեին զնա իբրեւ [յա]	tel qu’on le voyait comme
ռաջինն քան զ’ի բացաստան[ն]	avant de partir
f. 1r	
[մեկնել]ո[յ] .եւ դար	pour sa retraite. Et en-
ձ[եալ զհոգւոյ]ն [ս˜բ] զի	core la pureté de l’âme, car
[ոչ իբրեւ ի տրտմ]ութենէ բը	ni opprimée comme
ռնասբաւսեալ. եւ	par la tristesse,
[ոչ ի տեսանելով] զժողովս	[ni voyant] les foules
ա	par-
մենայն հարթ իբրեւ	faitement égal comme
ակալ ի բնութեան	se trouvant dans un état naturel.
[եւ բ]ազում ախտաժէտս անդ	Et le Seigneur guérit de nombreux infirmes
[որ ե]կեալ բժըշկեա[ց] տ˜ր ի ձեռն	qui étaient venus là, par son
[ն]որա [եւ] զայլ [ի] դիւաց բժըշ	intermédiaire et il en guérissait d’autre(s)
[կէր շն]ո[]րհս սա[յր ան]տո[նեայ ի] խաւ	des démons. Il donnait à Antoine une grâce
[սել եւ այսպէս զբազում տրտմ]	dans ses paroles et ainsi il consolait
ունս [մխ]իթա[րէր եւ բազում]	de nombreux affligés et réconciliait
[կռ]ու[եալս հաշտեցուցանէր ի]	de nombreux querelleurs (les amenant) à
[խաղաղութիւն] ամենեցո	la paix ; disant
[ւն ասելով մի] ինչ ամենե[ւին]	à tous de n’absolument rien

On observera l’orthographe archaïque : այ**ղ**, ամե**րհ**ի, պա**րհ**, տեսան**եի**ն. Ce déchiffrement pourra et devra être amélioré.

Fig. 4 : Sin. syr. NF frg. 76, f. 1r (© St. Catherine’s Monastery, Sinai, Egypt)

Pour conclure : le Sinai Palimpsests Project nous a permis de donner une image plus complète de cette bibliothèque monastique dans ses siècles les plus reculés, de l'activité des moines copistes, des textes souhaités par les lecteurs et, plus largement, une meilleure connaissance des communautés monastiques du Sinaï et de la Palestine. Une moitié des palimpsestes a été proposée à l'étude : souhaitons qu'il soit possible d'avoir accès à l'autre moitié, un jour pas trop éloigné, dans les mêmes excellentes conditions.

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Zaza Aleksidze (†) and Dali Chitunashvili

Unknown Palimpsest of an Iadgari from the Sinai Collection of Georgian Manuscripts

Across the entire Christian world, only a few manuscripts have preserved material relating to the oldest Christian liturgy, namely the Jerusalem rite. Once the liturgical practice of Constantinople had achieved dominance, those books which contained the liturgical practice of Jerusalem were removed from everyday use. Only a few texts containing this material written in Greek have survived until today, and these have survived by accident. However, it is possible to study the earliest Christian liturgy with the help of the traditions of the eastern Christian nations, which survive mainly in Georgian, Armenian, and Caucasian Albanian. If the Georgian translation of the Lectionary, together with the Armenian and Albanian Lectionaries, still remains one of the main sources for the study of the Jerusalem Lectionary, then the collection of liturgical chants translated into Georgian is unique for the study of the origin and development of early hymnography. The *Iadgari* is the one of the most ancient Georgian collections of chants, and the greater part of it was translated from Greek. It contains chants for the entire ecclesiastical year, and it is the hymnographical complement to the Jerusalem Lectionary. Although a Greek collection was presumably the basis for the formation of the Georgian *Iadgari*, no textual evidence for this has yet been found, so the only opportunity for studying the ancient hymnody is provided by a small number of Georgian manuscripts. The identification of a new manuscript containing the text of the *Iadgari* gives us new opportunities for studying this unique collection of chants and its later development.

Among the Georgian manuscripts kept at St. Catherine's Monastery on Mount Sinai, the manuscript Sin. geo. NF 7 has attracted our attention. According to the catalogue, the manuscript, which contains 154 folios, dates back to the 13th century, and consists of a collection of chants. It includes *troparia*, *ypakoi (kontakia)*, and *oikoi* for fixed feasts (ff. 1r–64r); ff. 64v–154v represents a part of George the Hagiorite's (1009–1066) *parakletike*, in particular chants of the Mode 1 for the week from Monday to Saturday. The whole manuscript is palimpsest. Nothing is known about the time and place of its copying. The beginning and end of the manuscript are missing, and there is no colophon preserved.[1]

As a result of our study, it has become clear that in the manuscript there are two lower layers, which should be distinguished from each other. Both layers are written in *Nuskhuri* script, but differ from each other with regard to *mise-en-page*, grapheme drawing, and timing. The undertext of the main part of the manuscript, ff. 1–12 and 49–154, is written in large size *Nuskhuri* script in one column. Usually in a column there are 15 lines, although occasionally 14 or 16 lines are also found. This part of the palimpsest contains Psalms (Fig. 1).

The undertext present on ff. 13–48 of the palimpsest differs from the undertext in the main part of the manuscript. In this section, there are 22/23/25 lines to the page. The text is written in a delicate fine *Nuskhuri* script, which paleographically can be dated to the 10th century (Fig. 2). Study of the palimpsest has shown that the manuscript contains the text of the *Iadgari*. A commemoration attested next to one of the chants makes it possible to date the manuscript with greater precision.

In the process of deciphering the palimpsest, at the end of chants of Nicholas of Myra (Sin. geo. NF 7, f. 21r), one part of the text appeared to be written in *Mtavruli* script (Fig. 3). After deciphering, the *Mtavruli* text reads as follows: ⴖ(ⴓⴑⴀ)ო ⴔⴈⴊⴜⴀⴔⴖ, ⴓⴔⴣ ⴄⴊⴀⴂ ⴚⴔⴜⴔⴈⴊ ⴓⴓⴈⴚⴔⴖⴔ ⴀⴓ ⴔⴂⴈⴜⴈⴚⴔⴖⴔ ⴖ(ⴈⴔⴀ)ⴔⴄ ⴆ(ⴓⴔ)თ[ⴈⴔⴀ] [*c'(mida)o nik'olaoz, meox eq'av* ***tornik'*** *ʒmiturt da šviliturt c'(ina)še γ(mr)t[isa]*] ('May you Saint Nikolaoz intercede for Tornikios with his brother and child before the God').

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[1] Aleksidze *et al.*, *Κατάλογος γεωργιανών χειρογράφων*, 251–252.

Who might the '*Tornik*' (Tornikios) be who is mentioned in the commemoration, and what might be his connection with this manuscript?

Fig. 1: Sin. geo. NF 7, f. 83r
(© St. Catherine's Monastery, Sinai, Egypt)

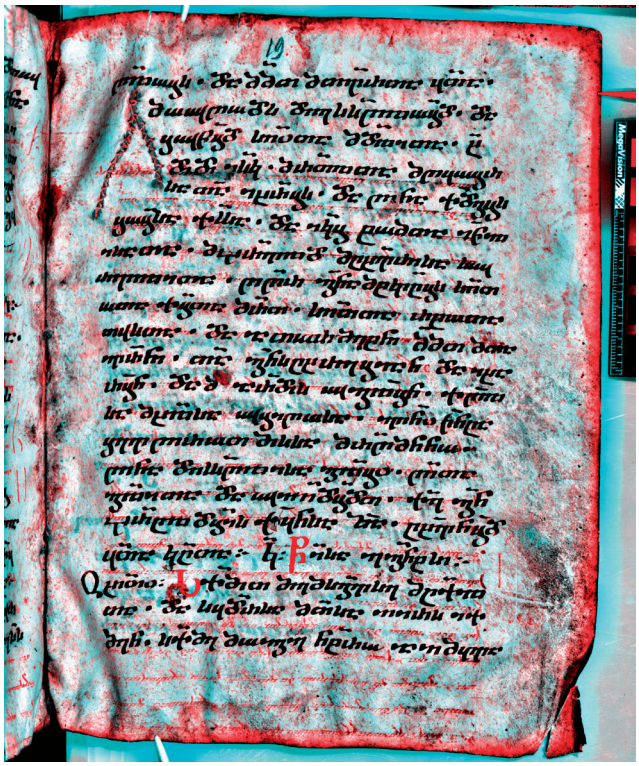

Fig. 2: Sin. geo. NF 7, f. 19r
(© St. Catherine's Monastery, Sinai, Egypt)

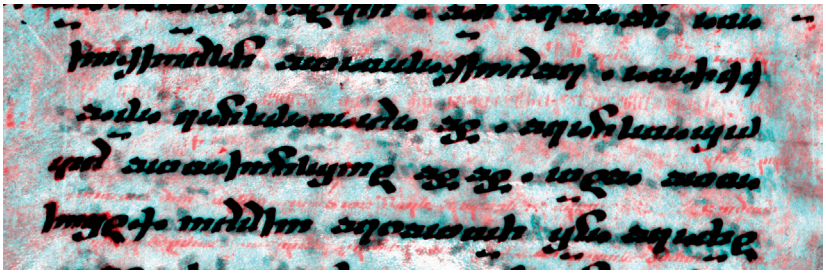

Fig. 3: Sin. geo. NF 7, f. 21r (© St. Catherine's Monastery, Sinai, Egypt)

The form of the commemoration present in the palimpsest, along with its phraseology and the names mentioned, is reminiscent of the commemoration of the Oshki Bible (Athos, Ivir. georg. 1, copied in 978–979)[2], which belonged to Tornik Eristavi (Duke Tornikios/John Tornikios), who was a famous figure in the second half of the 10th century in the Tao region of Southern Georgia, a representative of the Chordvaneli House. On f. 276v of the manuscript we read: ქრისტე, ადიდე მამაჲ იოვანე-თორნიკ მოძღურით, ძმით და შვილითურთ [*krist'e, adide mamaj iovane-**tornik'** moʒgurit, ʒmit da šviliturt*] ('Christ, exalt father John-Tornik with his confessor, brother and child').[3] As we see, there are similarities as well as differences between these two commemorations: in the palimpsest, Tornik is mentioned only by his secular name, whereas in the Oshki Bible, next to his secular name we see his monastic name, John, which Tornik received after he took monastic vows. The palimpsest also does not mention Tornik's confessor. However, the ending of both invocations is the same: ძმით და შვილითურთ [*ʒmit da šviliturt*] ('with brother and child').

There is no doubt that the commemoration asking St. Nicholas of Myra for mercy was made on behalf of Duke Tornikios. He would have been the benefactor of the manuscript, and the mention of Eristavi (duke) only by his secular name must indicate that the manuscript was copied when Tornikios had not yet taken monastic vows on Mount Athos, i.e. before 973.[4] Accordingly, we should suppose that the manuscript originated from the Tao-Klarjeti region (historical South Georgia, now Turkey). Unfortunately, as the manuscript is not complete, we do not know where the *Iadgari* ordered by Tornik was kept before it was used as the material for a new manuscript, but we can guess that it may have been among the other Georgian manuscripts sent from Tao to the newly-founded Georgian Monastery on Mount Athos.

The identification and study of the *Iadgari* texts has revealed that the palimpsest preserves a rather later redaction of the *Iadgari.* It should be explained that the *Iadgari* collection of hymns underwent a long process of development. Its oldest redaction, the *Ancient Iadgari,* is attested mainly in Sinai manuscripts and is already published.[5] The *New Iadgari* reflects a later stage of the development of the collection of hymns, and is preserved in a number of manuscripts, the important copies of which are also preserved in the Sinai collection. The palimpsest contains the hymns for December-January. We were able to read and identify one part of the hymns with the help of manuscripts containing the text of the *New Iadgari*—Sin. geo. 59, Sin. geo. 64, and Sin. geo. 65. For textual comparisons, we used the most complete copy of the *New Iadgari*, the so-called *Iadgari* of Mikael Modrekili, which was copied in 978–988 in the historic territory of Tao-Klarjeti.[6]

At this point, the following feasts of saints can be identified:

Hymns for December*:* St. Sabbas the Sanctified (ff. 15v, 18v, 26r–v, 29r); St. Nicholas of Myra (ff. 15r, 21v–r, 32r–v); St. John of Damascus (f. 21r); St. Eustratius and his companions (f. 22v–r); St. Modestus (ff. 25r, 28r, 42v); St. Ignatius (ff. 34r–v, 37r); St. Paul of Thebes and St. Antony (f. 25v); St. James, brother of Jesus (f. 30r–v).

Hymns for January: St. Jude the Apostle (f. 33r); St. Timothy the Apostle (f. 33v); St. Nino the Illuminator (f. 23r–v); St. Maximus the Confessor (f. 38r); St. Anthony the Great (f. 19r); St. Theodosius the Great (f. 14v); St. Paul of Thebes (f. 14v); the Epiphany and St. John (ff. 17r–v, 16r–v); St. Philotheus (f. 45v).

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[2] The manuscript is preserved today at the Iviron Monastery on Mount Athos, see Blake, *Catalogue des manuscrits géorgiens*, 301–304.

[3] Gigineishvili and Kikvidze (eds.), *C'ignni ʒuelisa aγtkumisani,* 561.

[4] E. Metreveli supposes the earliest date of Iovane-Tornike's being on Athos was 973. See Metreveli, *Nark'vevebi Atonis*, 9.

[5] Metreveli *et al.* (eds.), *Uʒvelesi iadgari.*

[6] Metreveli *et al.*, *Kartul xelnac'erta aγc'eriloba*, 544.

The chants for Epiphany are preserved in a large number of folios of the palimpsest, the copying and identification of which are difficult because the text has vanished and only a few sentences or words remain.

Because the manuscript is palimpsest with the erased text out of sequence, it is often difficult to determine the sequence of the hymns and it is almost impossible to distinguish the days of the feasts. It would appear that they were written in red ink and have been completely removed. The titles of the chants are not legible even in the multi-spectral images.

Studying the material has shown that, with regard to the sequence of feasts, the palimpsested *Iadgari* does not follow exactly the sequence of any other copies known to date. To enable comparison, the following table gives an excerpt from the January feasts:[7]

Sin. geo. NF 7	**Sin. geo. 59**	**Sin. geo. 64–65**	**Mikael Modrekili *Great Iadgari***
14 January St. Nino the Illuminator	14 January St. Nino the Illuminator	14 January St. Nino the Illuminator	14 January *Holy Fathers of Sketis*
—	—	—	15 January St. Babylas of Antioch
16 January Dedication of the Theotokos church in Choziba: *The great mystery was born by a Virgin*	—	16 January Dedication of the Theotokos church in Choziba: *Mother of Lord, Holy Virgin*	16 January Dedication of the Theotokos church in Choziba: *The great mystery was born by a Virgin*
17 January St. Anthony the Great	17 January St. Anthony the Great	17 January St. Anthony the Great	17 January St. Anthony the Great
18 January St. Paul of Thebes	18 January St. Paul of Thebes	18 January St. Paul of Thebes	18 January *St. Anthony Ravakh*
19 January *St. Theodosius the Great*	19 January St. Anthony Ravakh	19 January St. Anthony Ravakh	19 January *St. Theodosius the Great*
—	20 January St. Maximus the Confessor	20 January St. Euthymius the Great	20 January St. Euthymius the Great
21 January St. Maximus the Confessor	—	21 January St. Maximus the Confessor	21 January St. Maximus the Confessor
22 January St. Timothy the Apostle	—	22 January St. Timothy the Apostle	22 January *Four Archangels*
23 January St. Jude the Apostle	—	23 January St. Jude the Apostle	—

As we can see, the palimpsest has similarities and differences with almost every manuscript, but it is closest to the manuscript Sin. geo. 64–65.

Particularly notable are the differences in the calendar. As already mentioned, in the palimpsest the titles of months and numbers are poorly legible. However, they can sometimes still be distinguished. The numbers are written in *Asomtavruli* script, so that we know the calendar date and the hymn for that date is also partially readable (see ff. 17v, 21r). However, the name of the saint for any particular day still cannot be determined. In some cases, the names of the saints are readable, but none of the other calendars include the feasts of these saints on that very day. For example, f. 25v of the manuscript, which is the recto side for the palimpsest, preserves the hymn for the day of 16 December (unfortunately, the name of the month cannot be read, but the other side of the folio contains the hymn for Modestus, Patriarch of Jerusalem, which clearly indicates that it should be December 16, since according to Sin. geo. 64–65, Modestus' feast day is 16 December).[8] Before 16 December, the hymn texts in the palimpsest are easier to read. In the chants, the names of St. Paul and St. Anthony are mentioned together, suggesting that these are St. Paul of Thebes and St. Anthony the Great. Their feast in the old liturgical tradition is in January (17 and 18 January), and this is how their celebrations appear

[7] The italics mark the differences between the manuscripts.

[8] Metreveli *et al.*, *Kartul xelnac'erta ayc'eriloba*, 223.

in Sinai *Iadgaris*,[9] as well as in the palimpsest, while none of the calendars include the feasts of St. Paul and St. Anthony in December.[10] It is precisely peculiarities of this kind that make the Sinai palimpsest particularly important for the study of the development of *Iadgari*.

The same may be said about the structure of the hymns, which sometimes appear in our palimpsest in a different order. In the *Great Iadgari* copied in 978–979, which is considered to be the most complete copy of the *New Iadgari*, the first hymn of Anthony the Great's eight hymns differs from the hymn presented in the palimpsest; however, the remaining hymns are the same (the italicized text marks those sections that differ between the two manuscripts, while the bold typeface is used to indicate the portions of text that are missing in the parallel witness):

Sin. geo. NF 7	***Great Iadgari* (Tbilisi, National Centre of Manuscripts, Ms. S-425, ff. 107v–110v)**
f. 19v გჳქადაგე ერთი ღმრთეებაჲ სამგუამოვნებით, ღირსო მამაო ანტონი, ხოლო ერთი სამებისაგანი ორითა ბუნებით გჳჩუენე ჩუენ და აღვიარებთ ყოველნი [ ] სამნი ყრმანი.	*გიხაროდენ, თანაზიარო ანგელოზთა მაღალთა შინა, ანტონი, რამეთუ ამათ ცხორებაჲ ქუეყანასა ზედა მოიგე, მამაო, ჭეშმარიტებით, რაჟამს სიწმიდით ჰმოქალაქობდი სათნოვებით და გამოშჩნდი შენ ვითარცა.*
[მ]ამაო ანტონი, განსწმიდე შენ გონებანი, სულნი და ჴორცნი და ტრფიალებითა ღმრთისაჲთა გ(ა) ნბრწყინვებული ესრეთ ღაღადებდი [ ]	[მ]ამაო ანტონი, განსწმიდე შენ გონებანი, სულნი და ჴორცნი და ტრფიალებითა ღმრთისაჲთა გ(ა) ნბრწყინვებული ესრეთ ჰღაღადებდ... ...
მამაო ანტონი, ყოველი სათნოებაჲ შრომითი შეჰკრიბე და იქმენ მოწამე სისხლთა დაუთხეველად და ღაღადებდი აკურთხევთ[ყოველნი საქმენი უფალსა და ამაღლებდით]	მამაო ანტონი, ყოველი სათნოებაჲ შრომითი შეჰკრიბე და იქმენ მოწამე სისხლთა დაუთხეველად და ღაღადებდი აკურთხევ.
მამაო ანტონი, სათნოებისა ეტლთა შრომითა ამჴედრიდი [ ]	მამაო ანტონი, სათნოებისა ეტლთა შრომითა აჰმჴედრდი...
მამაო ანტონი, [საკჳრველ იქმნა] ჩუენგან ცხორებაჲ [შენი რამეთუ] იქმენ შენ მსგავს უჴორცოთა[იტყ]ოდე აკურთხევდით ყოველნი [სამებაჲ გუეც.]	მამაო ანტონი, საკჳრველ იქმნა ჩუენგან ცხორებაჲ შენი, რამეთუ იქმენ შენ მსგავს უჴორცოთა მსახურ სამებისა და იტყოდე აკურთხევდით ყოველნი სამებაჲ გუეც.
ადიდებდითსა რომელმან წინაჲსწარ [ ] რ](ომე)ლნი საშუებელნი სოფლიონი განიძარცუნა და საჭურველი ქრისტესი შემოსა, ანტონი, ვითარცა სულთა ჩუენთა მეოხსა დაუცხრომელად[ ] მართალო [ანტონი] სარწმუნოებითა შეჭურვილსა	*ადიდებდითსა* რ(ომელმა)ნ წინაჲსწარ [ ] [რ](ომე)ლნი საშუებელნი სოფლიონი განიძარცუნა და საჭურველი ქრისტესი შემოსა, ანტონი, ვითარცა სულთა ჩუენთა მეოხსა დაუცხრომელად[ ] მართალო ანტონი, სათნოვებათა მოგებითა ზეცად აღიწიე და შრომანი შესწირენ...სათნოვებითი შეჭურვილსა

The same situation can be observed with regard to the hymn for Theodosius the Great. As has been shown, the palimpsest has preserved a section of the hymn for Theodosius on 19 January. This hymn was created by the famous Georgian hymnographer, Ioane Minchkhi. Of the other manuscripts, only Mikael Modrekili's *Great Iadgari* (National Centre of Manuscripts, Ms. S-425, ff. 110r–111v) contains this hymn of Ioane Minchkhi. It is notable that this text is not found in any other Sinai manuscripts containing *Iadgari*. Collating the texts of Modrekili and the palimpsest has revealed some variant readings. In addition, as it is seen by collating the two texts, the structure of the palimpsest is also different:

[9] Metreveli *et al.*, *Kartul xelnac'erta aγc'eriloba*, 162–186 and 208–228.

[10] In addition to published calendars and liturgical books, we also rely on the Database of the Cult of Saints created at Oxford University, see http://csla.history.ox.ac.uk/ (accessed 01.07.2023).

Sin. geo. NF 7	***Great Iadgari* (Tbilisi, National Centre of Manuscripts, ms. S-425, ff. 110r–111v)**
f. 14v სიბრძნით გ(ა)ნ(მ)გ(ე)ბელო ი(ესო)ჳ, სიტყუაო დაუბადებელო, დ(ა)ბ(ა)დებულნი გადიდებენ მ(ა) მ(ი)სა თ(ა)ნა ს(უ)ლით წ(მი)დითურთ, მ(არა)დის დაუდუმებელად. გიგალობენ ანგელოზნი და გმონებენ ადამეანნი სუფ(ე)ვაჲ შ(ე)ნი სუფევა არს უკ(უნისამდ) ე. შენ *იდიდები* ქ(რისტ)ე ერნი *ზ(ე)ც(ა)თანი,* ს(უ)ლნი უჯორცოთანი, შ[(ე)ნ მოს]ცემ ლ(ო)ცვასა მდაბალთა ქ(უე) ყ(ა)ნისათა, მორწმუნეთა, ს(ა)თნოთა შ(ე)ნთა. რ(ა)ჟ(ა) მს [იყო] ურვასა შ(ი)ნა უმწყემსოებისა ზრუნვასა ერი იგი სამწყსოჲ ქ(რისტ)ესი, მ(ა)შინ მოვიდა *მასთ(ა)ნ* კაცი ღ(მრ)თისაჲ რ(ომე)ლი ეტყოდა: “ევედრენით ღ(მერთ)სა ფ(რია)დ და მ(ო)გცეს თქ(უე)ნ მწყემსი კ(ე)თ(ი)ლი”. მ(ა)შინ იწყო მ(ა)რხვად და ლ(ო)ცვად სიმრავლემან მ(ო)რწმუნეთამან, ერთობით ჴმობდეს ქ(რისტ)ეს მიმართ: “მოხედენ, მჴსნელო, ვენაჴსა ამას შ(ე)ნსა, რ(ომე)ლი დაასხი ჴელითა პირველ მეფისა კოსტანტინე მორწმუნისაჲთა”. f. 14r [ ]სცხო გონიერებაჲ, გ[არდაი]ცვ[ალა] გ(უ)ლი მისი და მეფეჲ ყო იონთა ზ(ედ)ა. შრომანი შ(ე)ნნი ს[ულიერნი] და კეთილნი სათნოებანი და გ(უ)ლ(ი)სა სიწრფოებანი, დიდო თეოდოსი, იხილნა-რაჲ მაღალმან, [მოხედვა-ყო წყალობით, რომელი ჰხედავს]მდაბალთა და გადიდა [სულით და ჴორცით.] ს[აღმრთოსა] ტ[აკუკსა] ვ(ითარც)ა *ეჯუანი* ჴმატკბილი, შუენიერი დღესასწაული შ(ე)ნი ენითა *ებანთა* ღმრთისმეტყუელთა მგალობელთაჲთა დღეს ოხრის ჴმამაღლად ეკლესიასა შ(ი)ნა შ(ე)ნთა მ(ა)თ სათნოებათა და სიმდაბლეთა, ღ(მრ)თისმსახურო და მის მიერ პატივცემულო, დიდო მეფეო, თევდოსი ღ(მერ)თშემოსილო, რ(ამეთუ) სახე ექმენი *პ(ი)რველთა* მათ მეფეთა და რ(ომე)ლნი გემსგავსნეს იშუებენ ედემს შ(ი)ნა შ(ე)ნ თ(ა)ნა და[ ]ითხოე ს(უ)ლთა [ ] მრ. ქ(რისტ)ეს მოყუარეო თევდოსი, ვერ შემძლებელ ვართ ჩ(უე)ნ შემსგავსებით ქ(ე)ბასა სათნოე(ბა)თა შ(ენ)თასა, ა(რამე)დ მ(ა)დლი შ(ე)ნი შეგუეწიენ მგალობელთა და ვადიდოთ *დღეს(ა) სწაული* შ(ე)ნი. შიში ღ(მრ)თის(ა)ჲ გაქუნდა მ(არა)დის, ნეტარო თევდოსი, და მ(ი)თ მოიძულენ შ(ე)ნ ყ(ოვე)ლივე ნებაჲ ჴ(ო)რცთაჲ და ვ(ითარც)ა უჯორცოჲ იქცეო[დე], რ(ომ)ლისათჳს საცნაურად გადიდა შ(ე)ნ *ქ(რისტემა)ნ.* ღ(მრ)თისა [მამი]სა სიმდიდრეო, [გ]იყუარან გლახაკნი და აცხო[ვნებ მდაბალთა, რომელმან] აღამაღლე დღეს შ(ე)ნთჳს ნათეს…	სიბრძნით განმგებელო იესუ, სიტყუაო დაუბადებელო, დაბადებულნი გადიდებენ მამისა თანა სულით წმიდითურთ, მარადის დაუდუმებელად. გიგალობენ ანგელოზნი და გმონებენ ადამეანნი. სუფევაჲ შენი სუფევა არს *უკუნითი* უკუნისამდე. შენ *გადიდებენ* ქრისტე ერნი *ზეცისანი,* სულნი უჯორცოთანი, შენ მოსცემ ლოცვასა მდაბალთა ქუეყანისათა, მორწმუნეთა, სათნოთა შენთა. რაჟამს იყო ურვასა შინა უმწყემსოებისა ზრუნვასა ერი იგი სამწყსოჲ ქრისტესი, მაშინ მოვიდა *მათა* კაცი ღმრთისაჲ რომელი ეტყოდა: “ევედრენით ღმერთსა ფრიად და მოგცეს თქუენ მწყემსი კეთილი”. მაშინ იწყო მარხვად და ლოცვად სიმრავლემან მორწმუნეთამან, ერთობით ჴმობდეს ქრისტეს მიმართ: “მოხედენ, მჴსნელო, ვენაჴსა ამას შენსა, რომელი დაასხი ჴელითა პირველ მეფისა კოსტანტინე მორწმუნისაჲთა”. ***ესმა ღმერთსა ჴმაჲ ვედრებისა მორწმუნეთა თჳსთაჲ, შეიწირნა ლოცვანი მათნი და მოსცა მათ სარწმუნოჲ და გონიერი თევდოსი მართალი სათნოდ მეფედ და წინამძღურად, ვითარცა დავით ისრაჱლთა.***[11] სამუელ წინაწარმეტყუელმან სცხო დავითს მწყემსობასა შინა, ხოლო აწ თევდოსის მართალსა სიგლახაკესა შინა სულმან წმიდამან სცხო გონიერებაჲ, გარდაიცვალა გული მისი და მეფეჲ ყო იონთა ზედა. შრომანი შენნი სულიერნი და კეთილნი სათნოებანი და გულისა სიწრფოებანი, დიდო თეოდოსი, იხილნა-რაჲ მაღალმან, მოხედვა-ყო წყალობით, რომელი ჰხედავს მდაბალთა და გადიდა სულით და ჴორცით. საღმრთოსა ტაკუკსა. ღმრ. ვითარცა *ებანი* ჴმატკბილი, შუენიერი დღესასწაული შ(ე)ნი ენითა *შემასხმელთა* ღმრთისმეტყუელთა მგალობელთაჲთა დღეს ოხრის ჴმამაღლად ეკლესიასა შინა შენთა მათ სათნოებათა და სიმდაბლეთა, ღმრთისმსახურო და მის მიერ პატივცემულო, დიდო მეფეო, თევდოსი ღმერთშემოსილო, რამეთუ სახე ექმენი *შემდგომთა* მათ მეფეთა და რ(ომე)ლნი გემსგავსნეს იშუებენ ედემს შ(ი)ნა შ(ე)ნ თ(ა)ნა ღმერთსა ევედრე აწ მონიჭებად სულთა ჩუნეთა დღეს დიდი წყალობაჲ. მრ. ქ(რისტ)ეს მოყუარეო თევდოსი, ვერ შემძლებელ ვართ ჩ(უე)ნ შემსგავსებით ქ(ე)ბასა სათნოე(ბა)თა შ(ე)თასა, ა(რამე)დ მ(ა)დლი შ(ე)ნი შეგუეწიენ მგალობელთა და ვადიდოთ *ჴსენებაჲ* შენი. შიში ღმრთისაჲ გაქუნდა მარადის, ნეტარო თევდოსი, და მით მოიძულენ შენ ყოველივე ნებაჲ ჴორცთაჲ და ვითარცა უჯორცოჲ იქცეოდე, რომლისათჳს საცნაურად გადიდა შ(ე)ნ *ღმერთმან.* ღმრთისა მამისა სიმდიდრეო, გიყუარან გლახაკნი და აცხოვნებ მდაბალთა, რომელმან აღამაღლე დღეს შენთჳს ნათესავთაგან...

[11] In the palimpsest, the opening lines are cut, but the number of lines cut cannot be as much as two, thus the Ode presented in bold in the hymns of *Great Iadgari* is not missing in the palimpsest because of the excision, but was never in the manuscript.

The ancient liturgy of Jerusalem is still rather poorly known. There are a large number of unstudied and unedited sources, mainly in Georgian, and that number has increased with our palimpsest manuscript, which presents the text of *Iadgari*. We have noted that only the first stage of development of this hymnographical collection, i.e. the so-called *Ancient Iadgari*, is published, but there is no edition of the *New Iadgari*. The sequence of commemorating the saints (the Calendar), as well as the structure and content of the chants themselves, differ in our palimpsest from all well-known Georgian manuscripts of *New Iadgari* (Sin. geo. 59, Sin. geo. 64–65, and Tbilisi, National Centre of Manuscripts, ms. S-425). The study of this palimpsest manuscript gives us the opportunity to observe the history of the development of this collection of ancient chants of the Jerusalem rite.

Finally, manuscript Sin. geo. NF 7 must be mentioned alongside the other three manuscripts (the Oshki Bible; Athos, Ivir. georg. 3, containing the *Life of John Chrysostom*; and Athos, Ivir. georg. 9, containing *The Paradise* and *The Treasure*) which were copied at the order of Tornik Eristavi and donated to the newly-founded Georgian Monastery on Mount Athos in the early 980s.

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Jost Gippert

New Light on the Caucasian Albanian Palimpsests of St. Catherine's Monastery

INTRODUCTION

Among the palimpsest manuscripts stored in the library of St. Catherine's Monastery on Mount Sinai, Sin. geo. NF 13 and NF 55 are unusal indeed, since they contain in their undertexts the remnants of at least six different original codices in four different languages, viz. Georgian, Palestinian Aramaic, Armenian, and Caucasian Albanian. For the last of these languages, they represent the only manuscript sources known to have survived.

An international project supported by the Volkswagen Foundation from 1999 to 2008 facilitated a first attempt to decipher and edit the undertexts of Sin. geo. NF 13 and NF 55. The results were published in three volumes of the series *Palaeographia Medii Aevi* (subseries *Ibero-Caucasica*) between 2008 and 2010.[1] By applying ultraviolet and multispectral imaging, the undertexts of 106 out of the 107 folios of Sin. geo. NF 13, and 55 out of the 59 folios of Sin. geo. NF 55 were identified, reconstructed, and published. 119 of them were written in Caucasian Albanian, and 42 in Armenian. Two folios in Caucasian Albanian (Sin. geo. NF 55, ff. 1 and 5), as well as the only two folios in Aramaic (Sin. geo. NF 55, ff. 19 and 20) and the single folio in Georgian (Sin. geo. NF 13, f. 58), remained unidentified.

The Caucasian Albanian and Armenian undertexts of Sin. geo. NF 13 and NF 55 could each be proven to stem from two different underlying codices. In the case of Caucasian Albanian, the first is a codex containing St. John's Gospel, and the second derives from a lectionary mostly with lections from the New Testament (Gospels of Matthew, Mark, and Luke; Pauline and Catholic Epistles). In the case of Armenian, we have one codex comprising the Old Testament books attributed to Solomon (Ecclesiastes, Song of Songs, Wisdom) and one containing the Pauline Epistles with the Euthalian apparatus.

The actual readability rate for the four original codices was very variable. In the case of the codices containing Caucasian Albanian, the Gospel codex had a far lower readability rate (an average of max. 25%) than the lectionary (nearly 100%). The lectionary thus provided the majority of the clues for deciphering the language and its script (together with a rather unreliable alphabet list contained in an Armenian encyclopaedic manuscript of the 13th century).[2] In the case of the Armenian originals, the remnants of the New Testament codex were more readable (ca. 60%) than those of the Old Testament codex (ca. 30%), mostly because the latter was overwritten horizontally (folios either unturned or turned by 180°), with the upper script to a large extent covering the lower script.

The Sinai Palimpsests Project, running from 2011 to 2016 with support from the Arcadia Fund, has enabled profound new insights concerning both Sin. geo. NF 13 and NF 55. First, it has led to a remarkable increase in the readability rate of the undertexts, especially of the Caucasian Albanian Gospel codex. This was achieved by the use of transmissive light imaging, a technique that was not yet available ten years earlier. Even though this technology usually only yields good results on one side of parchment leaves (the flesh side), it made it possible not only to improve the reconstruction of about half of the Albanian Gospel text, but also to decipher the two folios that had previously remained unidentified (Sin. geo. NF 55, ff. 1 and 5, a bifolio of the original codex, now identified as containing John 20:30–21:15;[3] Fig. 1 showing ff. 1v and 5r, i.e., the flesh side), as well

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[1] Gippert *et al.*, *Caucasian Albanian Palimpsests,* vols. I and II; Gippert, *Caucasian Albanian Palimpsests*, vol. III.

[2] Cf. Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. I, II-1–17 for details.

[3] Cf. Gippert, When Person Overcomes Class, 41–43 for details.

as to verify a correction concerning the content of two further folios (Sin. geo. NF 55, ff. 45 and 40, also an original bifolio, cf. below). In addition, 19 new minor fragments of the palimpsests were detected, 17 of which have since been identified. These fragments have proved to be extremely important for the reconstruction of the codices. In the following pages, I shall illustrate these achievements by presenting a number of examples.

Fig. 1: Sin. geo. NF 55, bifolio consisting of ff. 1v and 5r
(© St. Catherine's Monastery, Sinai, Egypt)

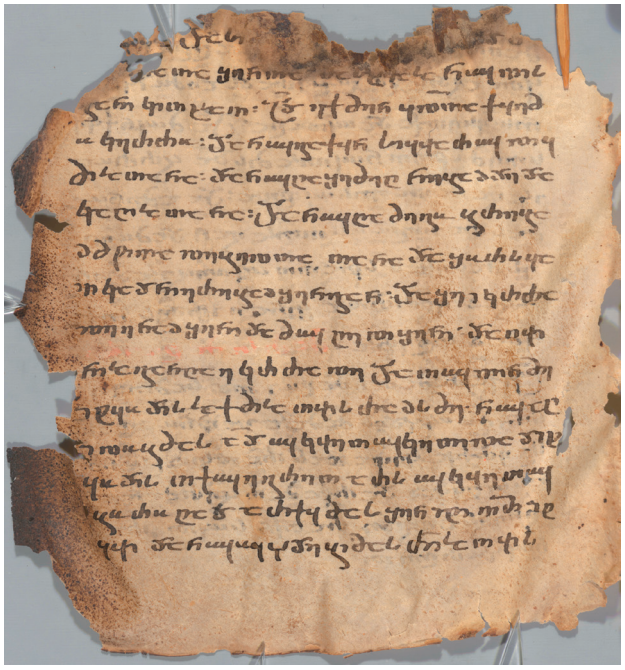


Fig. 2(a): Sin. geo. NF 55, f. 40v
(© St. Catherine's Monastery, Sinai, Egypt)

Fig. 2(b): Sin. geo. NF 55, f. 35r
(© St. Catherine's Monastery, Sinai, Egypt)

INSIGHTS GAINED BY THE USE OF TRANSMISSIVE LIGHT

In preparing the edition of 2009, only two Albanian characters could be detected on the original bifolio re-used as ff. 35 and 40 in Sin. geo. NF 55 (Fig. 2[a] and [b]), viz. the sequence 𐬀𐬅- = *ao* in the second line of f. 35r, assumed to represent the 15th line of the bifolio. The assumption that the bifolio *in toto* covered John 20:30–21:14, with the two characters belonging to John 21:10 (Fig. 3),[4] was not based upon a proposed reading but simply on codicological considerations. After a thorough re-examination of the available multispectral images, the present author proposed another identification in 2012, according to which the bifolio contained John 18:16–31 instead; the sequence *ao* would in this case have been part of the word *kahan**ao**wġoybån'ioya* 'of the high priest' (lit. 'of the big one of the priests'), assumed to represent Gk. τοῦ ἀρχιερέως in John 18:26 (Fig. 4 showing the reconstruction of lines 14–16).[5]

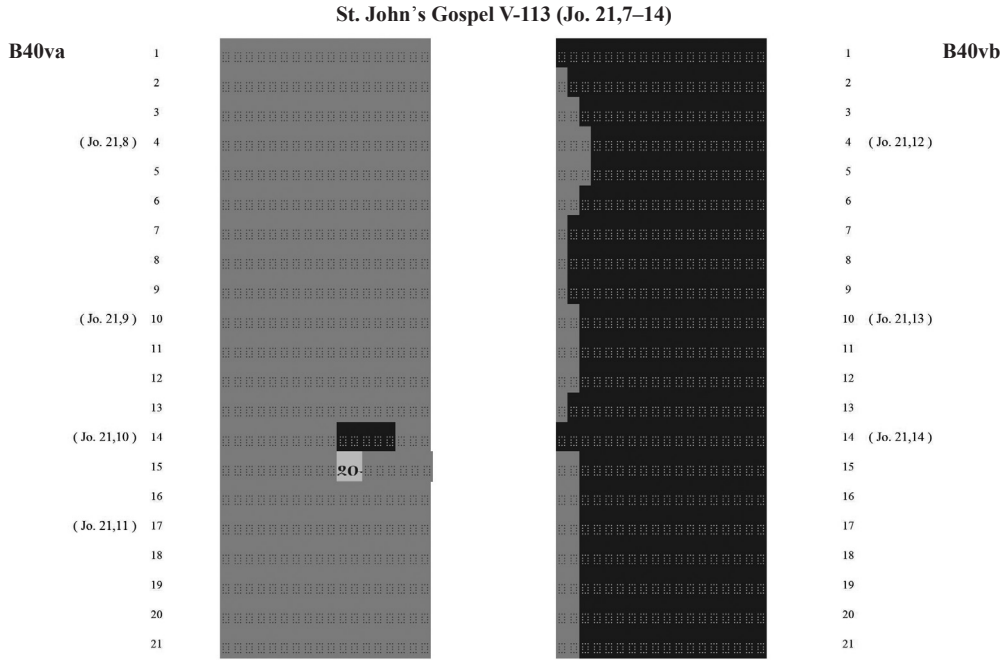
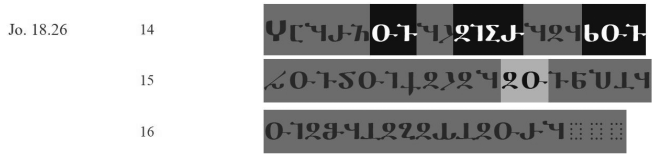


Fig. 3: Rendering of Sin. geo. NF 55, ff. 40v and 35r in the edition (source: Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. II, V-113)



pē-ne	*sown*	*hayḳe*	*nai'ow|ʒowġoy*	*kahanaowġoybån'i|oya*	*čin'a-qarn'aoen ...*
said[10]	one	certain[11]	of servants[12]	of high-priest[13]	a relative[14] ...
λέγει	εἷς		ἐκ τῶν δούλων	τοῦ ἀρχιερέως,	συγγενὴς ὢν ...
Ew asē	*mi*	*omn*	*i carayic'*	*k'ahanayapetin*	*azgakan ...*

pē-ne sown hayḳe nai'owʒowġoy kahanaowġoybån'ioya čin'a-qarn'aoen ...
"One of the servants of the high-priest, a relative ..., said ..."

Fig. 4: Revised rendering of Sin. geo. NF 55, f. 35r, ll. 14–16 (source: Gippert, The Albanian Gospel Manuscript – New Findings, 63)

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[4] Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. II, V-110–113. Here and in the following renderings, three degrees of readability are distinguished by printing in black, dark, and light grey; with decreasing reliability of the reading, the background colour changes from white to middle grey accordingly. Erased characters are represented outlined, and characters that are restituted outside of the preserved fragment are printed white on a dark grey background. In transcriptions, different kinds of brackets are used to indicate the levels of readability and preservation: (parentheses) mark minor readability, [square brackets], minimal readability, {curly brackets}, reconstructed (but not readable) text passages within the preserved fragment, and <angle brackets>, restored passages outside of the preserved fragment. Cf. Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. I, I-38.

[5] Gippert, The Albanian Gospel Manuscript – New Findings, 62–64.

In contrast to the older multispectral images, the transmissive light images provided by the Sinai Palimpsests Project in 2016 disclosed all 21 lines of the first column on the flesh side of the bifolio in question (Fig. 5[a] and [b]). They revealed that the identification of the content proposed in 2012 (John 18:16–31) was correct. However, they also proved that the character sequence mentioned was not part of line 15 but of line 14, and that it belonged not to *kahan**ao**wġoyban'ioya* but to the word immediately following it, *çin'**ao**en* 'a relative'. The three lines in question (13–15), representing John 18:26 (Fig. 6), thus read as follows:

Line		Reproduction	Transliteration
12		ⷘⷓⷖⷪⷭⷕⷖⷪⷯⷪⷓⷖⷪⷭⷕⷖⷪⷯ	*pēne sown haśḳe nai*
13		ⷭⷕⷭⷤⷕⷭⷍⷕⷭⷕⷖⷪⷭⷕⷖⷪⷭ	*ʿowrowġoχoc kahanaow*
14		ⷍⷕⷭⷓⷕⷭⷕⷖⷪⷭⷕⷖⷪⷭⷕⷖⷪⷭⷕⷖⷪ	*ġoybån'ioya çin'aoen o*
Transcription *pē-ne sown haśḳe naiʿowrowġoχoc kahanaowġoybån'ioya çin'aoen oya ...* 'One of the servants of the high-priest, a relative of his, said ...'			

Fig. 5(a): Sin. geo. NF 55, f. 40v (transmissive image)
(© St. Catherine's Monastery, Sinai, Egypt)

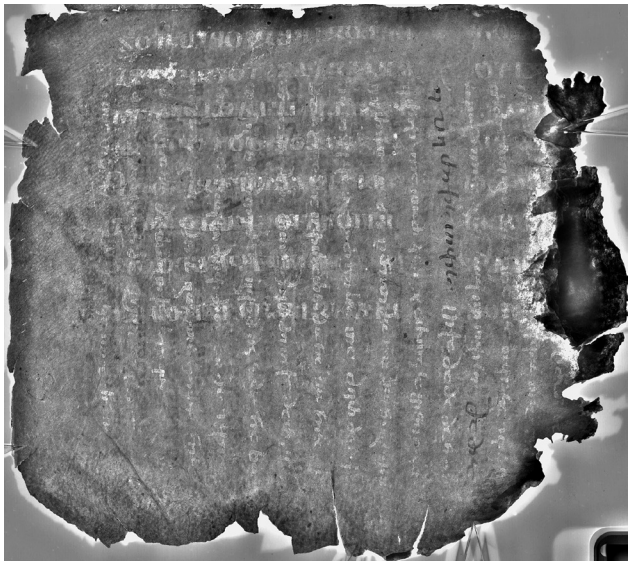


Fig. 5(b): Sin. geo. NF 55, f. 35r (transmissive image)
(© St. Catherine's Monastery, Sinai, Egypt)

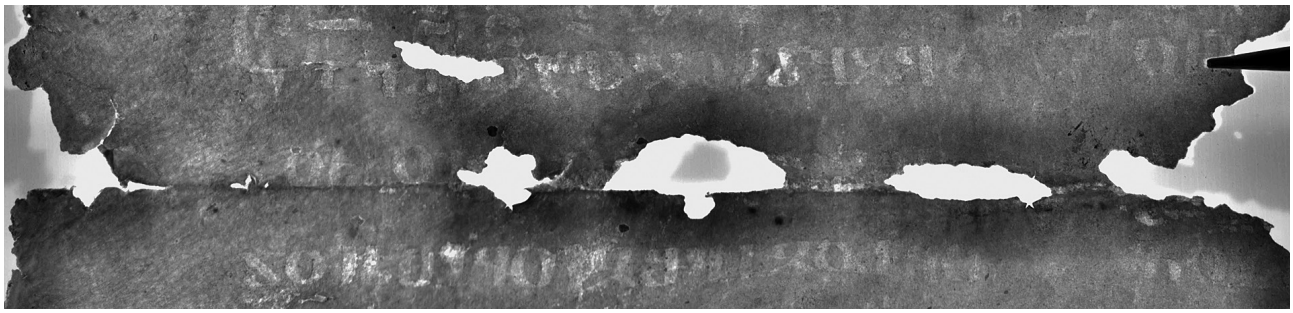


Fig. 6: Sin. geo. NF 55, ff. 40v and 35r, ll. 13–15 (transmissive image)
(© St. Catherine's Monastery, Sinai, Egypt)

On f. 35r, the same column ends with John 18:28. The text is, again, very readable. It begins with ԿՆՕ-ՀՐԿԻ-ՇՀՋԿ = *I boḳē-ne y(isow)sax* ‘Now they led Jesus’. Only the first five letters of the following word survive: they can be made out as ՋՀԳՔԿ = *aspṗin* (Fig. 5[b]). The remainder of the word must have appeared in the first line of the second column which, however, seems to have been burnt off *in toto* in the top right corner of f. 40v (Fig. 5[a]). The first character of the second column cannot be made out in any image available. This is all the more regrettable since it is quite probable that we would have had here the first specimen of one of the three characters of the Caucasian Albanian alphabet that have not yet been detected in the Sinai palimpsests. It is clear that the given word must have denoted the ‘lodge’ or ‘mansion’ of Caiaphas, just as *vankʿ* does in the Armenian New Testament (*ew acen zy(isow)s i vanacʿ kayiapʿay*... ‘and they led Jesus from the lodge of Caiaphas...’, contrasting with simple ἄγουσιν οὖν τὸν Ἰησοῦν ἀπὸ τοῦ Καϊάφα... in the Greek text); one more indication of the fact that the Albanian Bible text depends on the Armenian, not directly on the Greek. The Albanian word that may be assumed here is unattested elsewhere but it is clear that it must be a cognate of both Arm. *aspnǰakan* (< **aspinǰ*-) ‘hospitable, inn’ and Georg. *maspṗinʒel*- ‘host’, literally a participle formation *m-aspṗinʒ-el*- ‘hosting’, the basis of which has been preserved in the name of the town *aspṗinʒa* in South-West Georgia. Both the Armenian and the Georgian terms are borrowed from Middle Iranian, where we find Parth. *ispinǰ* and Middle Pers. *aspinǰ* ‘hospitality, inn’.[6] The question now is whether Albanian shared with Georgian the rendering of the Iranian affricate *ǰ* (i.e., *dj*) by *ʒ* (i.e., *dz*) or whether it agreed with Armenian in leaving the Iranian affricate as it was (as *ǯ*, i.e., *dj*). Whereas the character for *ʒ*, ⸗, is well attested elsewhere in the Albanian palimpsests, the character for *ǯ* has not yet been found. We know that it must have existed, given that it figures in the alphabet list of the 13th century, with a shape resembling our number 9 (Ԗ) and with its sound value indicated by the use of Arm. Ջ = *ǰ* in the name Ջայն = *ǰayn* assigned to it.[7] It is therefore a matter of utmost importance to see whether a remnant of the character in question can still be detected in the given position of Sin. geo. NF 55, f. 40v (Fig. 7[a] and [b]).[8]

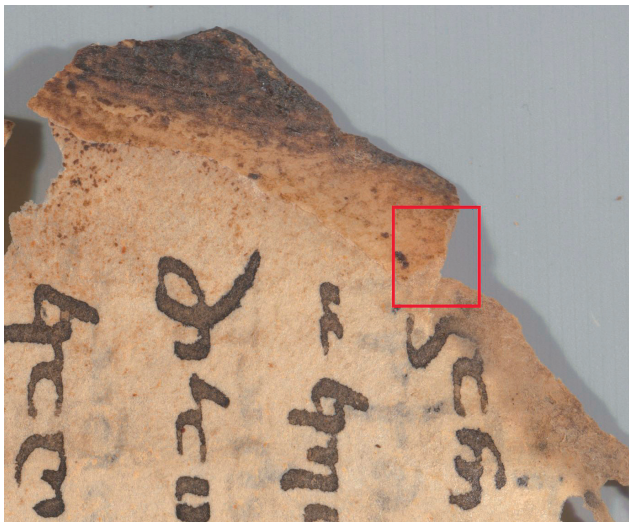


Fig. 7(a): Sin. geo. NF 55, f. 40v, top right corner (© St. Catherine’s Monastery, Sinai, Egypt)

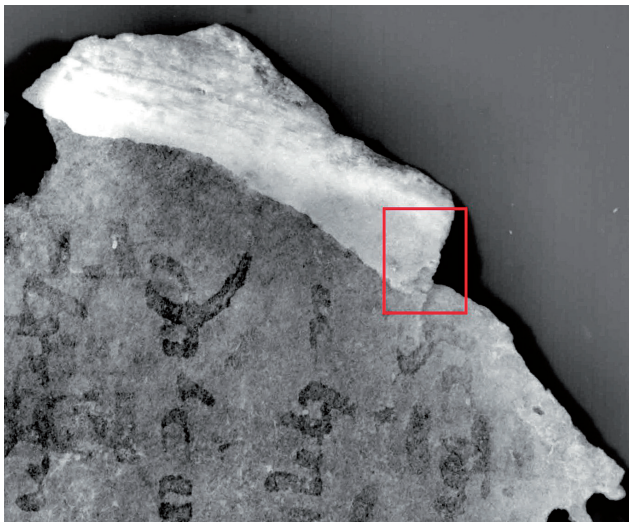


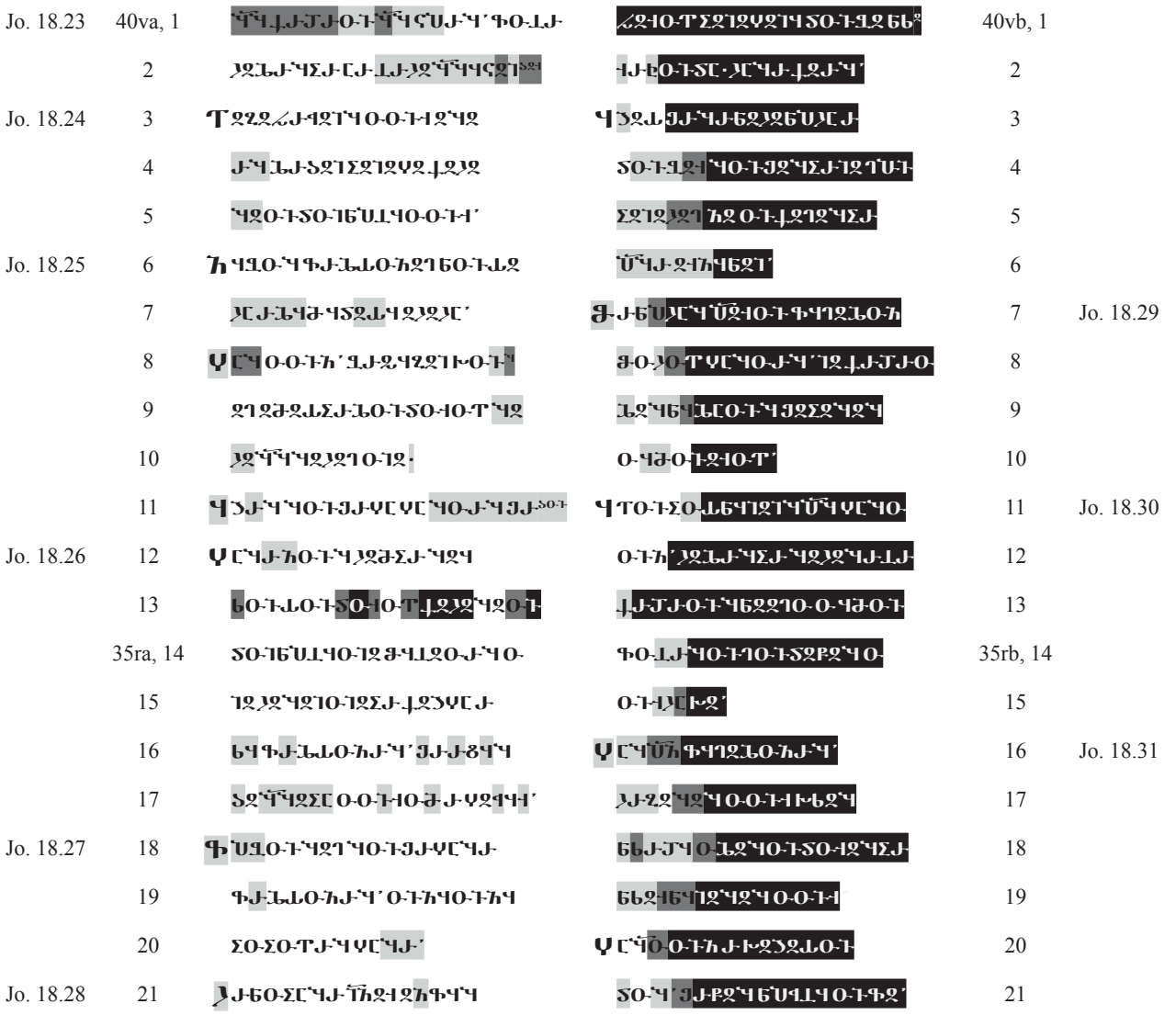
Fig. 7(b): Sin. geo. NF 55, f. 40v, top right corner, transmissive image (© St. Catherine’s Monastery, Sinai, Egypt)

[6] Cf. Schmitt, Iranian Influences, 455 for Arm. *aspnǰakan*; Androniḳašvili, *Narḳvevebi*, 287–288 for Georg. *maspṗinʒeli* and *aspṗinʒa*; and Durkin-Meisterernst, *Dictionary*, 87 s.v. *ʿspynj, ʿspync* and MacKenzie, *Dictionary*, 12 s.v. *aspinǰ* for the underlying Middle Iranian terms.

[7] Cf. Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. I, II-14 for details.

[8] A second attestation of the same word for ‘lodge’ might be present in the first visible line of the badly-damaged folio 104r of Sin. geo. NF 13, in the context of Acts 1:13 (cf. Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. II, VII-7 for details). Unfortunately here, too, the character in question is not discernible, only *-ṗi-* (of **aspṗinʒ/ǯ*) standing out.

Leaving the problem open for the time being, the content of the flesh side of the original bifolio represented by Sin. geo. NF 55, ff. 40v and 35r (Fig. 5[a] and [b]) can now be established with confidence, at least for the left column:



Jo. 18.23	40va, 1		40vb, 1		
	2		2		
Jo. 18.24	3		3		
	4		4		
	5		5		
Jo. 18.25	6		6		
	7		7	Jo. 18.29	
	8		8		
	9		9		
	10		10		
	11		11	Jo. 18.30	
Jo. 18.26	12		12		
	13		13		
	35ra, 14		35rb, 14		
	15		15		
	16		16	Jo. 18.31	
	17		17		
Jo. 18.27	18		18		
	19		19		
	20		20		
Jo. 18.28	21		21		

In a simplified transcription in Latin characters, the text of the left column would read as follows:

18.23 *"... |1 -n(ow)n kefeown(ow)n gåen. ṗon'e |2 haṭenḳe ē-en'e, ha-n(ow)n-igay zaχ?"*	"... |1 <witnes>s about what is bad. Then, |2 if it is good, why did you beat me?"
18.24 |3 *L'aǫa-ʒexay-n oowχ ana*|4*en ṭezay ḳayapa kaha*|5*naowġoy-bån'ioowχ.*	|3 Annas sent him |4 bound to Caiaphas the hi|5gh-priest.
18.25 |6 *Simon ṗeṭros-al bowra-*|7*hē eṭiš, iġari-aha-hē.* |8 *pē-n oows: "meçiqay vown-*|9*al ašarḳeṭowġoxoc n-a*|10*ha-n(ow)n-n-ahal oya?"* |11 *ičen nowte-pē pē-n-oen: "te-z(o)w."*	|6 Simon Peter stood |7 there, too, he was warming up. |8 They said to him: "Aren't you, |9 too, (one) of the disciples |10 of his?" |11 He denied (and) said: "I am not."
18.26 |12 *pē-ne sown hašḳe nai*|13*ʿowrowġoχoc kahanaow*|14*ġoy-bån'ioya çin'aoen o*|15*ya hanayoyaḳe kač-pē e* |16 *ʿi ṗeṭrosen: "te-eśin-*|17*za-n(ow)n-aḳē oowxoš e paxiχ?"*	|12 One from the se|13rvants of the high-|14priest, a relative of h|15im of whom |16 Peter had cut off the ear, said: "Did I not |17 see you then with him in the garden?"
18.27 |18 *Ṗåmown-al nowte-pē-ne* |19 *ṗeṭrosen; owsi-owsi* |20 *ḳoḳocen pē-ne.*	|18 And again Peter |19 denied; immediately |20 a rooster crowed.
18.28 |21 *He-boḳē-ne y(isow)saχ aspin*‖1*<ʒ/ʒaχoc ...>*	|21 Now they brought Jesus from the lod‖1<ge ...>

The transmissive light images not only enable significant additions to the text of the Gospel of John but also contribute some new words and forms. In 18:23, we find unextended *ha-* in the sense of 'what, why' (corresponding to Gk. τί, Arm. *əndēʾr*) in *ha-n(ow)n-igay* 'why did you beat (me)' (*-nown*, written abbreviated as usual, is the enclitic marker for the second person). In 18:24, we read *ţezay* 'bound' (corresponding to Gk. δεδεμένον, Arm. *kapeal*), presupposing a verb *ţezesown* 'bind'.[9] 18:25 yields *iġari-aha-hē* 'he was warming up' (Gk. θερμαινόμενος, Arm. *ǰerīnoyr*), allowing a correction of the reconstruction of **<eġa>ri-i<ha-nan>* 'be fervent' in Rom. 12:11 (Sin. geo. NF 55, f. 34ra, 9–10) to **iġari-iha-nan.*[10] In 18:26, we further read *naiʿow-rowġoxoc* abl.pl. 'from the servants', yielding *naiʿowrowx* as the plural form of *naiʿow* 'servant' instead of irregular **naiʿowʒowx* assumed formerly (for John 15:15; Sin. geo. NF 13, f. 30ra, 6).[11] Still in 18:26, we now have *čin'aoen* 'relative', erg.sg. of the referentialised paradigm of *čin'a*, a genitive derivative of *či(n)* 'nation, tribe, sort', *kač-pē* '(he) beat' (past; the verbal noun would be *kač-pesown* 'beat(ing)'), and *paxiẋ* dat.sg. 'in the garden' (of a hitherto unattested noun *pax* 'garden'). And in 18:27, we read *ķoķocen* erg.sg. 'rooster', presupposing a stem *ķoķoc*[12] and thus rendering the reconstruction of a genitive **<ķowķ>owç'in* in Is. 35:7 (Sin. geo. NF 13, f. 70ra, 21–22)[13] improbable. An important contribution to the knowledge of Albanian grammar is provided by *te-eśin-za-n(ow)n-aķē* 'did I not see you then' (lit. 'were you not visible to me then') in 18:26, which proves that in the sequence of personal clitics, a dative (*za* 'to me') can precede an absolutive case form (*nown* 'you' [sg.])—an arrangement that has previously been questioned.[14]

The example of this bifolio shows that the technology of imaging with transmissive light provides enough new insights into the text to render a revised edition of at least the Gospel codex worthwhile.[15]

THE NEW FRAGMENTS AND THEIR IDENTIFICATION

The 19 fragments newly detected in the course of the Sinai Palimpsests Project have been associated with Sin. geo. NF 55 and assigned 'folio' numbers 60 to 78, which is a practical solution for the purpose of easy referencing. It does not, however, say anything about their contents and actual positions within the codicological ensemble. As a matter of fact, the edition of 2009 has clearly proved that Sin. geo. NF 13 and NF 55 represent one codex from the point of view of the Georgian overtext, the first folio of NF 55 (as the first folio of the 18th quire) continuing (after a lacuna of one folio) the 10th (or 3rd) sermon of Abba Isaiah of Scetis which begins on f. 101v of NF 13, and the text of John the Faster, *De Poenitentia*, *Continentia et Virginitate*, which begins on f. 41v and extends up to f. 59 of NF 55, continuing again on f. 79r of NF 13 (as the last folio of the 22nd quire). The complete Georgian codex, distorted as it is, must have comprised at least 24 quires, with at least three quires missing at the beginning and some others after the last folio, which is f. 95v of NF 13. Its immensely variegated structure as established for the edition can roughly be illustrated as given below.[16]

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[9] Possibly the form *ţezay* was corrected to *zeţay* in the undertext as a misspelling: *zeţay* in the sense of 'bound' is attested elsewhere, e.g., in Acts 12:6 (Sin. geo. NF 13, f. 48ra, l. 16).

[10] Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. II, VII-54–55. In the two dialects of the Udi language, which is the closest relative of Caucasian Albanian today, we find *eġari-* in Niž and *iġari-* in Vartašen, cf. Gukasyan, *Slovar'*, 120 s.vv. *eġaribalo* 'feverish, febrile', *eġaribesun* 'fever, be febrile', *eġaribi* 'feverish, febrile', and *eġarix* 'hot, heat'. Caucasian Albanian corresponds to the Vartašen form.

[11] Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. II, V-82–83.

[12] Corresponding to Udi *ķoķoç* 'chicken', cf. Gukasyan, *Slovar'*, 144.

[13] Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. II, VI-24–25.

[14] Cf. Gippert, When Person Overcomes Class, 37.

[15] For another example cf. the *editio princeps* of the undertext of Sin. geo. NF 55, ff. 1va and 5ra in Gippert, When Person Overcomes Class, 41–43.

[16] Cf. Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. I, I-3–5. Quire numbers indicated without brackets in the Table are preserved as such in the codex. In the Table, a grey background marks missing parts. Quires indicated by numbers on a reddish background belong to Sin. geo. NF 13, quires on a greenish background to Sin. geo. NF 55; correspondingly, folio numbers of Sin. geo. NF 13 are indicated by an orange background, folio numbers of Sin. geo. NF 55 on an olive background. The different textual contents of the Georgian overtext of the two codices are indicated by different shades of yellow, blueish, or violet backgrounds.

Quire	Folio	Contents	Part	Comment
*[I]	8 folios missing	*Life of St. Antony* (*CPG* 2101)		The beginning is lost. The missing paragraphs (1–16 and 18–27) may well have covered four complete quires as indicated
*[II]	8 folios missing			
*[III]	8 folios missing			
[IV]	4 folios missing			
	NF 13, f. 104rv		§§ 16–17	
	3 folios missing			
V	1 folio missing			
	NF 13, f. 1r–7r		§§ 37–44	
	NF 13, f. 7v		§§ 44–45	Text abridged, with colophon
VI	NF 13, f. 8r–9r		§§ 55–56	
	NF 13, f. 9v			
	NF 13, f. 10rv	*(Apophthegms)*	[Gk. no. 1]	Apophthegms concerning St. Antony inserted into the *Life* instead of §§ 57–87
	NF 13, f. 11r		[nos. 1, 3–4, 6–10]	
			[no. 10–11]	
	NF 13, f. 11v–15v	*Life of St. Antony*	§§ 88–89	The *Life* recommencing
			§§ 89–94	
VII	NF 13, f. 16r		§ 94	End of the *Life*, with colophon
	NF 13, f. 16v		§ 94	Author mark
	NF 13, f. 17r	*Letters of St. Antony* (*CPG* 2330)	I, 1–4	Beginning of the 1st letter of St. Antony, missing in other Georgian mss.
	NF 13, f. 17v–23r		I, 4–12	
	NF 13, f. 23v		I, 12–78	
			I, 78	
VIII	NF 13, f. 24r–26v		II, 1–5	Beginning of the 2nd letter
	NF 13, f. 27r		II, 5–34	
	NF 13, f. 27v–30v		II, 34–38	
	NF 13, f. 31r		III, 1–3	Beginning of the 3rd letter
			III, 3–37	
	NF 13, f. 31v		III, 37–42	
IX	NF 13, f. 32r–39v		IV, 1–2	Beginning of the 4th letter
[X]	NF 13, f. 103rv		IV, 2–7	
	NF 13, f. 106rv		IV, 7–86	
	1 folio missing		IV, 86–96	
	1 folio missing		IV, 96–103	
	1 folio missing		[IV, 104–112]	
	1 folio missing		[IV, 112–117]	
	1 folio missing		[V, 1–5]	[Beginning of the 5th letter]
	NF 13, f. 105rv		[V, 6–18]	
	1 folio missing		[V, 18–28]	
[XI]	1 folio missing		V, 29–38	
	NF 13, f. 74v (!)		[V, 38–50]	
			[V, 50–61]	
	NF 13, ff. 74r–78r		V, 61[–66]	
	NF 13, f. 78v		VI, 1	Beginning of the 6th letter
			VI, 1–43	
	NF 13, f. 102rv		VI, 43–51	
	1 folio missing		VII, 1–6	Beginning of the 7th letter
			VII, 6–15	
			[VII, 15–20]	[End of the 7th letter]
XII	NF 13, f. 40r	*(Apophthegms)*	[Gk. no. 29,] 11, 13, 15	Apophthegms concerning St. Antony appended
	NF 13, ff. 40v–47v	*Letters of Macarius* (*CPG* 2415)	I	Beginning of the 1st letter of Macarius
XIII	NF 13, ff. 48r–57v			
	NF 13, f. 58r			
	NF 13, f. 58v	(vacat)		End of the letter missing

Quire	Folio	Contents	Part	Comment
XIV	NF 13, ff. 59r–60v	*Letters of Ammonas* (*CPG* 2380)	I	1st letter
	NF 13, ff. 61r–63r		II	2nd letter
	NF 13, f. 63v			
	NF 13, f. 64rv		III	3rd letter
	NF 13, f. 65r		IV	4th letter
	NF 13, ff. 65v–66v			
[XV]	NF 13, f. 67r		V	5th letter
	NF 13, f. 67v			
	NF 13, f. 68r		VI	6th letter
	NF 13, f. 68v			
	NF 13, f. 70r		VII	7th letter
	NF 13, ff. 70v–71r			
	NF 13, f. 71v	*Chapters of Ammonas* (*CPG* 2390)	1	1st chapter
	NF 13, f. 72r			
	NF 13, f. 72v		2	2nd chapter
	NF 13, f. 73r		3	3rd chapter
	NF 13, f. 73v		4	4th chapter
	NF 13, f. 69rv		[5]	[5th chapter]
	1 folio missing		6	6th chapter
[XVI]	NF 13, f. 107v (!)		7	7th chapter
	NF 13, f. 107r (!)		8	8th chapter
	NF 13, f. 96r		9	9th chapter
	NF 13, f. 96v		10	10th chapter
	NF 13, f. 97r		11	11th chapter
	NF 13, f. 97v		12	12th chapter
	NF 13, f. 98r		[12a]	Additional chapter
	NF 13, f. 98v		13	13th chapter
	NF 13, f. 99r		14	14th chapter
	NF 13, f. 99v		15	15th chapter
	NF 13, f. 100r		16	16th chapter
	NF 13, f. 100v		17	17th chapter
	NF 13, f. 101r		18	18th chapter
	NF 13, f. 101v		19	19th chapter
	1 folio missing	*Asceticon of Isaiah* (*CPG* 5555, excerpt)	X, 1–7	10th (3rd) discourse of Isaiah
[XVII]	NF 55, f. 1r		[X, 7–25]	
	NF 55, f. 1r		X, 25	End of Isaiah's discourse
	NF 55, f. 1v	*Homilies of St. Ephrem the Syrian* (*CPG* 4145)	1	Beginning of St. Ephrem's 1st homily
	NF 55, f. 2r		2	Final part of the 2nd homily
	NF 55, ff. 2v–3v			
	NF 55, ff. 54r–55r			
	NF 55, f. 55v		5	5th homily
	NF 55, f. 6rv			
	NF 55, ff. 4r–5v			
	NF 55, f. 7r			Final passage omitted
				3rd homily

Quire	Folio	Contents	Part	Comment
[XVIII]	NF 55, ff. 7v–9v		3	
	NF 55, ff. 10r–11r			Abridgement or lacuna?
	NF 55, ff. 11v–12v		3a?	*Life of Abraham*[17]
	NF 55, f. 13r			
	NF 55, ff. 13v–14v	*Apophthegms* (*CPG* 5594)	Poemen	
[XIX]	NF 55, ff. 15r–24v			
[XXa]	NF 55, ff. 25r–32r			
	NF 55, f. 32v			
[XXb]	NF 55, f. 33r		Petrus Pionita	
	NF 55, ff. 33v–34r		Sisoes	
	NF 55, ff. 34v			
	NF 55, ff. 35r		Sarmata	
	NF 55, ff. 35v–37r		Hyperechius	
	NF 55, f. 37v		Comas	
	NF 55, f. 38r		Dioscorus	
	NF 55, ff. 38v–39v		Cassianus	
	NF 55, f. 40r			
	NF 55, f. 40v		Matoes	
	NF 55, f. 41r			
	NF 55, f. 41v		Motius	
	NF 55, f. 42rv	*John the Faster, Homily on penitence, continence, and virginity* (*CPG* 7555)	1937A	Beginning of the homily
[XXI]	NF 55, f. 48rv		1937A–1940A	
	NF 55, ff. 43r–44v		1940A–C	
	NF 55, f. 46rv		1940D–1944A	
	NF 55, f. 45rv		1944A–D	
	NF 55, f. 47rv		1944D–1945B	
	NF 55, ff. 49r–50v		1945B–D	
XXII	NF 55, f. 51rv		1945D–1949B	
	NF 55, f. 57rv		1949B–1952A	
	NF 55, f. 53rv		1952A–C	
	NF 55, f. 52vr (!)		1952C–1953B	
	NF 55, f. 58rv		1953B–1956A	
	NF 55, f. 56rv		1956A–C	
	NF 55, f. 59rv		1956C–1957B	
	NF 13, f. 79rv		1957B–D	
XXIII	NF 13, ff. 80r–87v		1957D–1960C	
[XXIV]	NF 13, ff. 88r–93r		1960C–1969D	
	NF 13, f. 93v		1969D–1977B	
	NF 13, ff. 94r–95r		1977C	End of the homily
	NF 13, f. 95v	*Lives of the Desert Fathers* (*CPG* 5620)	Apollo	
			Patermuthius	

[17] Not yet determined in the edition, see Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. I, 1–19.

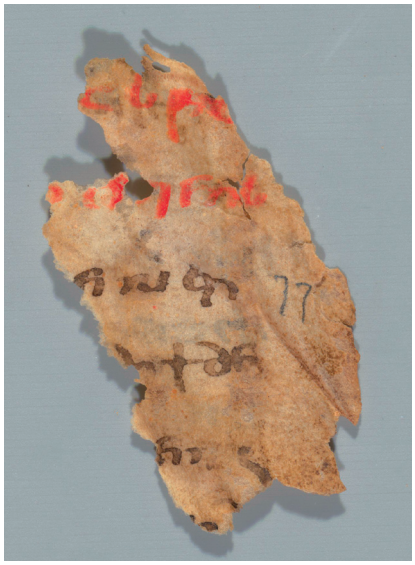

Fig. 8(a): Sin. geo. NF 55, f. 77r (© St. Catherine's Monastery, Sinai, Egypt)

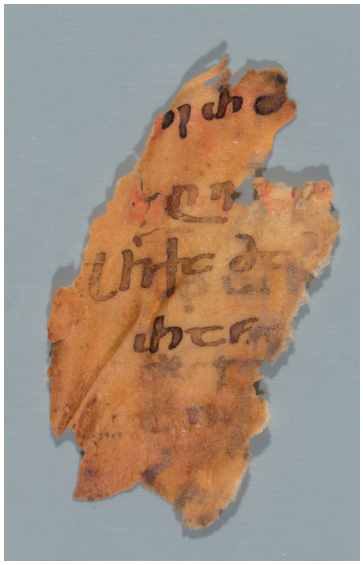

Fig. 8(b): Sin. geo. NF 55, f. 77v (© St. Catherine's Monastery, Sinai, Egypt)

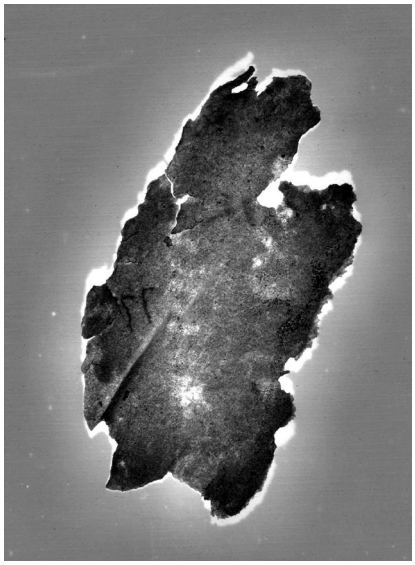

Fig. 8(c): Sin. geo. NF 55, f. 77v, transmissive image (© St. Catherine's Monastery, Sinai, Egypt)

Most of the newly-detected fragments exhibit only a very small number of characters. This is true, for example, of Frg. 77, which shows the remnants of max. six lines of the Georgian overtext, and of max. two lines of the undertext (Fig. 8[a] and [b] displaying the recto and verso of no. 77). It is clear that under these conditions, an identification can only be attempted on the basis of the overtext, and indeed, all 19 fragments have meanwhile found their place in the codicological ensemble of Sin. geo. NF 13 and NF 55. Frg. 77, for example, turned out to have been removed from the upper part of NF 55, f. 13, which contains Apophthegms nos. 9–13 concerning Poemen.[18] Even though the edges seem not to fit perfectly well (Fig. 9[a] and [b]), the continuity of the text leaves no room for doubt. The rubric on the recto, which indicates the beginning of the apophthegm section, is particularly telling;[19] cf. the following reconstruction of the lines in question (ll. 1–7, originally 3–9):

Line	NF 55, f. 13r	Frg. 77r	cf. *PG* 65, 326
3	*<... n>[ug]<e>[š]<inis>[cema]<y[20] d>*	*a sça-*	... consolation and various tea-
4	*<v>lani neṭarisa mamisa [ṗ*	*i]menis-*	chings of the blessed father Poe-
5	*ni titosaxeni :– ʒmama*	*n hki-*	men.[21] – Frater sic inter|rogavit
6	*txa mamasa ṗimens da rk(u)a v(itarme)d*	*mikmn-*	abbatem Poemenem: Com|misi
7	*ies codvay didi da minebs šena*	*neb-*	grande peccatum, et volo per
8	*is sam çel: da rk(u)a mas mamaman*	*ṗi<men>*	triennium agere poeniten|tiam. Di-
9	...		cit ei senex ...

[18] Numbered according to the mss. used in the edition Dvali, *Novelebi*, 164–165; the corresponding numbers are 12–13 and 15–16 in *PG* 65, 325–326.

[19] Cf. Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. I, I-19–20 for f. 13r.

[20] In Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. I, I-20, the word *nugešiniscemay* 'consolation' was not yet reconstructed; parts of *u*, *g*, *š*, *c*, *e*, *m*, and *a* are visible, which leave no other reconstruction possible.

[21] The manuscript Ivir. georg. 12 (f. 145v) of Mt. Athos has the title *sçavlani da txrobani titosaxeni mamisa ṗimenisni* 'Various teachings and narrations of father Poemen'. The Greek text in *PG* 65, 317A has only Περὶ τοῦ ἀββᾶ Ποιμένος.

Line	NF 55, f. 77v	NF 55, f. 13v	cf. *PG* 65, 326
			<Interrogavit abbas Anub abbatem Poemenem, de impuris cogitationibus quas gignit cor hominis, et de variis cogitationibus. Dicit ei abbas Poemen :>
3		*<... nuuḳue ididos-me culi>*	<Numquid gloriabitur securis
4	*<twni>er m*	*<ḳuetelisa da šena nu mis>-*	sine eo qui caedit in ipsa? Tu quoque ne
5	*cem m<a>*	*t qelsa da twt ukm ikmnen*	por|rigas eis manum et otiosae erunt.
6	*Tkua mam<a>*	*man ṗimen uḳuetumca a-*	Dixit iterum abbas Poemen : Ni|si
7	*ra na*	*buzardan mzarault mt-*	Nabuzardan coquorum
8	*ava*	*ri mosrul iq̇o aramca mo-*	pr|inceps venisset, non
9	*mç<u>*	*ar iq̇o ṭaʒari ...*	con|crematum fuisset templum ...

Fig. 9(a): Sin. geo. NF 55, f. 13r joined with f. 77v
(© St. Catherine's Monastery, Sinai, Egypt)

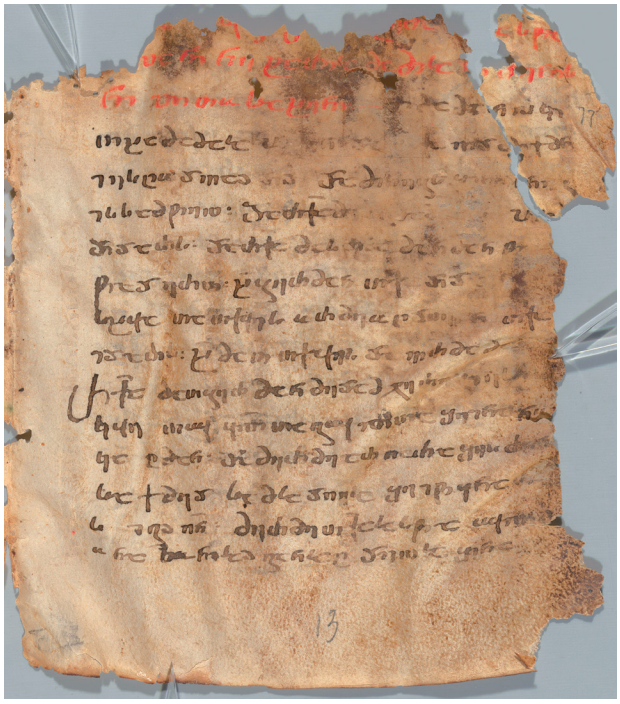

Fig. 9(b): Sin. geo. NF 55, f. 13v joined with f. 77r
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In a similar way, the two fragments 60 and 75 can be joined together, the Georgian overtext belonging to § 14 of the *Life of St. Antony* (Fig. 10), and Frg. 62 can be joined with f. 105 of Sin. geo. NF 13, a fragment itself, which contains parts of the 5th letter of St. Antony (Fig. 11). Remarkably enough, 12 of the fragments can be proven to stem from the missing folios of the first two quires of the Georgian codex (containing the *Life of St. Antony*), as shown in the Table below.

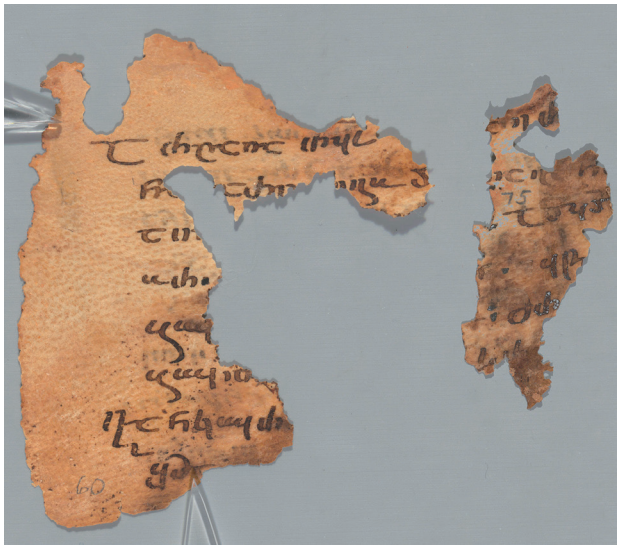

Fig. 10: Sin. geo. NF 55, f. 60r joined with f. 75r
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Fig. 11: Sin. geo. NF 13, f. 105r joined with NF 55, f. 62r
(© St. Catherine's Monastery, Sinai, Egypt)

Quire	Folio	Contents	Part	Comment
[I]	4 folios missing	*Life of St. Antony*		
	NF 55, f. 63vr		§§ 4–5	
	NF 55, f. 64vr			
	NF 55, f. 65vr		§ 6	
	NF 55, f. 67vr		§ 7	
[II]	NF 55, f. 69vr			
	NF 55, f. 70vr		§§ 8–9	
	NF 55, f. 71vr			
	NF 55, f. 72vr		§§ 10–11	
	NF 55, f. 66vr		§ 12	
	NF 55, f. 68vr		§ 13	
	NF 55, ff. 75vr+60vr		§ 14	
	1 folio missing			
[III]	NF 13, ff. 104rv		§§ 16–17	
	7 folios missing			
*[IV]	8 folios missing			
V	1 folio missing			

Frg. 73 (Fig. 12[a] and [b]), which contains a passage from the 10th (3rd) Sermon of Isaiah, is an unusual case. The identification of the text is warranted by the collation of two other codices of St. Catherine's, viz. Sin. geo. 25 and Sin. geo. 35, which contain the same sermon; cf. the parallel arrangement given below:

Fragment 73r	**Sin. geo. 35, f. 73ra, 8–16 / Sin. geo. 25, f. 94v, 10 – 95r, 2**	**Isaiah, *Logoi*, 43, 4–8, ed. Augoustinos (cf. *PG* 40, 1109B)**
	... ġav si-	... ποίησον ἀγ-
ġ	*ġuaruli : miiġe mcired zeti*	άπην καὶ λαβὲ μικρὸν ἔλαιον
da	*da icxe qorcta*[22] *š(e)nta : uḳuetu*	καὶ βάλε ἐντός σου· ἐὰν δὲ
ara	*ara inebos miuṭeve da ganisuenos :*	μὴ θελήσῃ λαβεῖν μετὰ ἀναπαύσεως[23] ...
š[ǯ]de	*šǯde ray ṭablasa z(ed)a ċabuḳ tu xa-*	Καθημένου σου ἐν τῇ τραπέζῃ μετὰ ἀδελφῶν, νεώτερος ὤ-
r [nu]	*r : nu iḳadreb rkumad visame ċa-*	ν, μὴ εἴπῃς τῷ νῷ φά-
me [a(rame)d] mo	*me a(rame)d moiqsenebd codvata šenta*	γε, ἀλλὰ μνήσθητι τῶν ἁμαρτιῶν σου,
r(ayt)a ara š[č]	*r(ayt)a ara ščamde gemoys moġuare-*	ἵνα μὴ ἐσθίῃς μεθ’ ἡδο-
bit ščamde [r]	*bit : ščamde ray*[24] *...*	νῆς ...

Fragment 73v	**Sin. geo. 35, f. 73rb, 11–19 / Sin. geo. 25, f. 95v, 2–8**	**Isaiah, *Logoi*, 43, 20–21, ed. Augoustinos (cf. *PG* 40, 1109C)**
u p	*... uḳuetu p-*	... Ἐὰν π-
[en] ba	*keray gaurvebdes daiċeben ba-*	νίγῃ σε χάσμη,
[i]ri š	*geni š(en)ni r(ayt)a ara aġaṭḳmo ṗiri š-*	μὴ ἀνοίξῃς τὸ στόμα σ-
[asa] ġ(ovla)d	*eni da ganisueno boġinebasa ġ(ovla)d-*	ου καὶ φεύξεται ἀπὸ σοῦ,
wḳwetu	*ve nu aġmouṭeveb : uḳuetu*	μὴ ἀνοίγῃς
icilisay	*iġos unebeli rayme sicilisay*	τὸ στόμα σου γελῶν
[š]ensa ḳma geġ	*nu aġsṭḳmob*[25] *ṗirsa šensa ḳma geġ-*	τὸ σύνολον, ἀφοβία γάρ
avn ⁖	*avn ...*	ἐστι ...

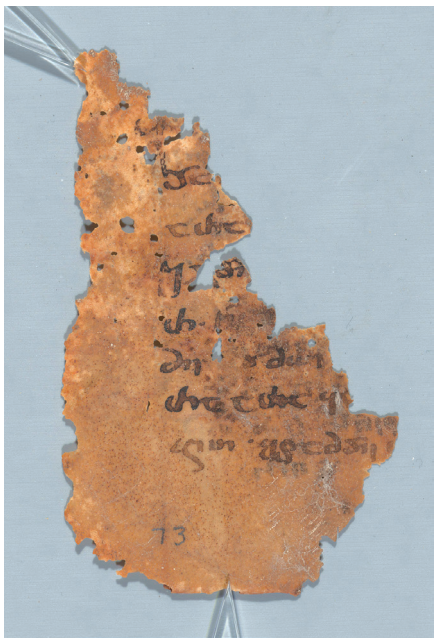

Fig. 12(a): Sin. geo. NF 55, f. 73r
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Fig. 12(b): Sin. geo. NF 55, f. 73v
(© St. Catherine’s Monastery, Sinai, Egypt)

[22] *icxe qorcta šenta* ‘anoint your body’ in Sin. geo. 35 vs. *icxe perqta šenta* ‘anoint your feet’ in Sin. geo. 25.

[23] The following two lines of the Greek text (μὴ κοπώσῃς αὐτόν, ἐὰν δέ ἐστι γέρων πρακτικός, βίασαι αὐτόν, ἕως οὗ ἀλείψῃ αὐτὸν ὅλον) have no equivalent in the Georgian version.

[24] The Georgian text recommences with ‘When you are eating’, vs. Gk. καί.

[25] Sic Sin. geo. 25, f. 73rb, l. 18; Sin. geo. 25, f. 95v, l. 7–8 has the better form *aġmṭkmob*.

Frg. 73 can thus be identified as a remnant of the folio that is missing between Sin. geo. NF 13, f. 101v and Sin. geo. NF 55, f. 1r, thus representing the missing link in the transition between the two present codices as illustrated below.

Quire	Folio	Contents	Part	Comment
[XV]	1 folio missing	*Chapters of Ammonas*	5	Missing
[XVI]	NF 13, f. 107vr (!)		6–19	Including 12a
	NF 13, f. 96rv			
	NF 13, f. 97rv			
	NF 13, f. 98rv			
	NF 13, f. 99rv			
	NF 13, f. 100rv			
	NF 13, f. 101rv	*Asceticon of Isaiah*	X, 1–7	10th (3rd) discourse of Isaiah
	NF 55, f. 73rv		X, 7–25	
[XVII]	NF 55, f. 1r		X, 25	End of Isaiah's discourse

THE NEW FRAGMENTS AND THEIR UNDERTEXTS

For fragments of the type dealt with here, the identification of the overtexts is normally a precondition for an identification of the undertexts. It is clear that in a case like Frg. 77, which has turned out to belong to f. 13 of Sin. geo. NF 55, the undertext must be the same as that of the latter, which has been determined to extend from John 19:23 to John 19:30.[26] The transmissive light image of the combined recto of f. 13 and Frg. 77 (Fig. 9[c]) clearly shows that the latter contains text of the first column, beginning with the first line of the original folio, which has been lost for f. 13. Even though the few characters are not enough to establish the text beyond doubt, we may safely assume that they belong to John 19:23, as the preceding bifolio consisting of Sin. geo. NF 13, ff. 17 and 22 ends with John 19:22.[27] In accordance with the Greek and Armenian texts, the first two lines of NF 55, ff. 77r+13r can be reconstructed as follows:

<p̣on' e e> {hʿib}[üwn ž]{in˜}<n>	<Then the> soldier<s>,
<hay>{ʒex}ay-{ank}<e-å˜n i>	whe<n they cru>cifie<d...>

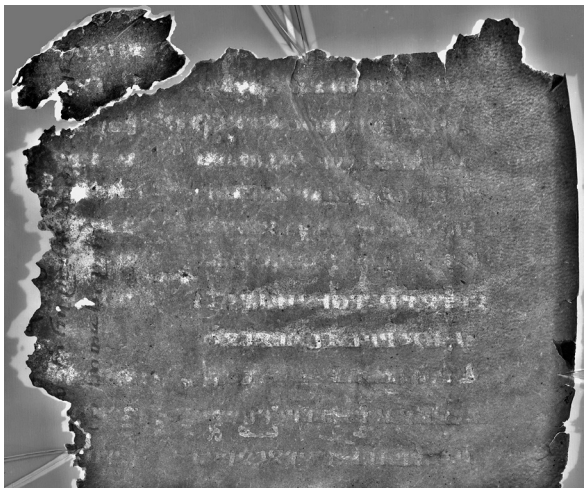


Fig. 9(c): Sin. geo. NF 55, f. 13r joined with f. 70v, transmissive image (© St. Catherine's Monastery, Sinai, Egypt)

[26] Cf. Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. II, V-98–101.
[27] Cf. Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. II, V-96–97.

In a similar way, Frg. 62, which can be joined to f. 105 of Sin. geo. NF 13 (cf. above), provides parts of the missing column of the bifolio consisting of ff. 105 and 106, which contains the 5th letter of St. Antony in its Georgian overtext and Luke 1:58–80 from the Caucasian Albanian lectionary in its undertext, with the recto of Frg. 62 covering Luke 1:64–65 (Fig. 11 and 13[a]). Remarkably enough, another scrap that was detected among the uncatalogued Georgian fragments of the New Finds in St. Catherine's Monastery in May 2009 turned out to belong to f. 106, i.e., the lower part of the same bifolio, containing Luke 1:67–68 on its recto and 72–74 on its verso (Fig. 13[b]).[28] Unfortunately this fragment was not accessible to the Sinai Palimpsests Project so there are no multispectral or transmissive light images available.

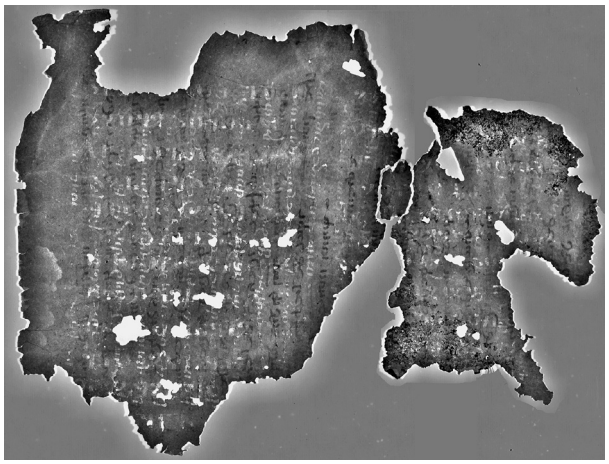


Fig. 13(a): Sin. geo. NF 13, f. 105r joined with NF 55, f. 62r, transmissive image (© St. Catherine's Monastery, Sinai, Egypt)

Fig. 13(b): Sin. geo. NF 13, ff. 105r and 106v joined with NF 55, f. 62r and unnumbered fragment (© St. Catherine's Monastery, Sinai, Egypt)

[28] Cf. Gippert, *Caucasian Albanian Palimpsests*, vol. III, I-21–25 for details and a reconstruction of the bifolio.

The same method of identification works just as well, of course, with undertexts other than Caucasian Albanian. This is true, e.g., of Frg. 61, which can be joined with Sin. geo. NF 13, f. 95 containing apophthegms on Apollo and Patermuthios from the *Historia monachorum* in its Georgian overtext[29] (Fig. 14[a] for the recto), and thus provides missing parts of the Armenian undertext comprising Song of Songs 7:12–8:2 on the recto (Fig. 14[b]) and 8:2–6 on the verso.[30]

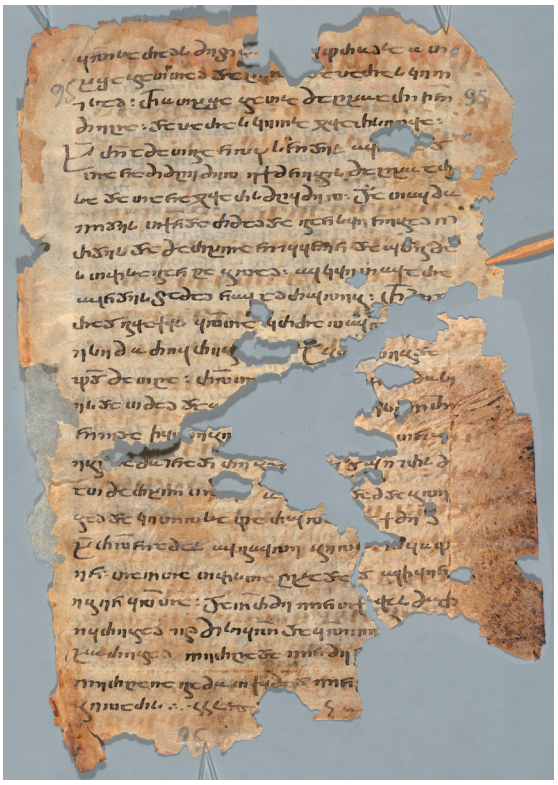


Fig. 14(a): Sin. geo. NF 13, f. 95r joined with NF 55, f. 61r (© St. Catherine's Monastery, Sinai, Egypt)

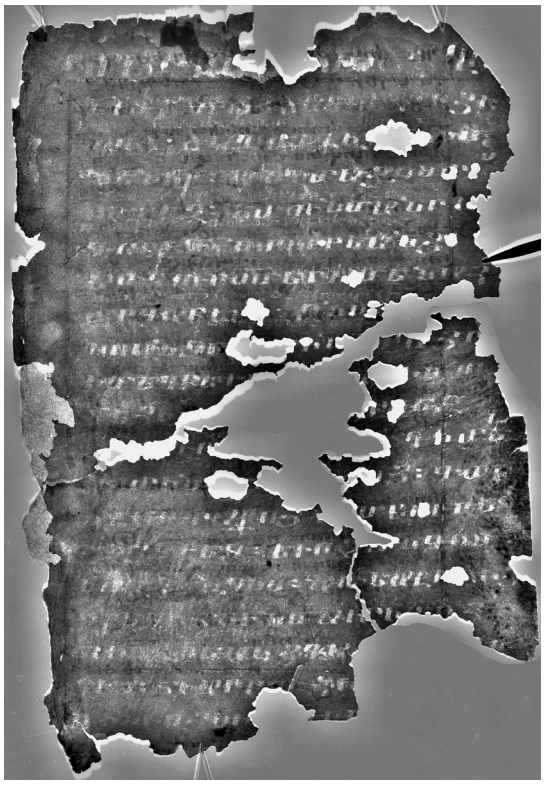
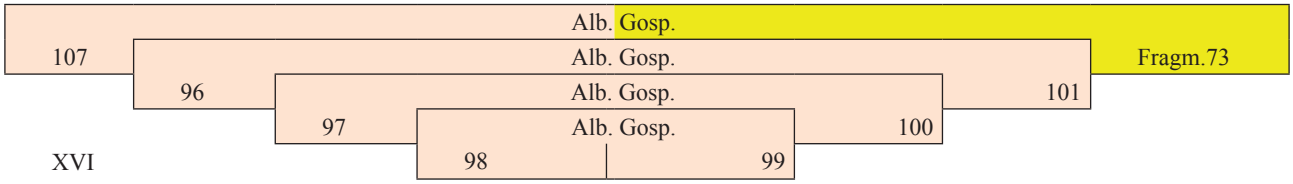


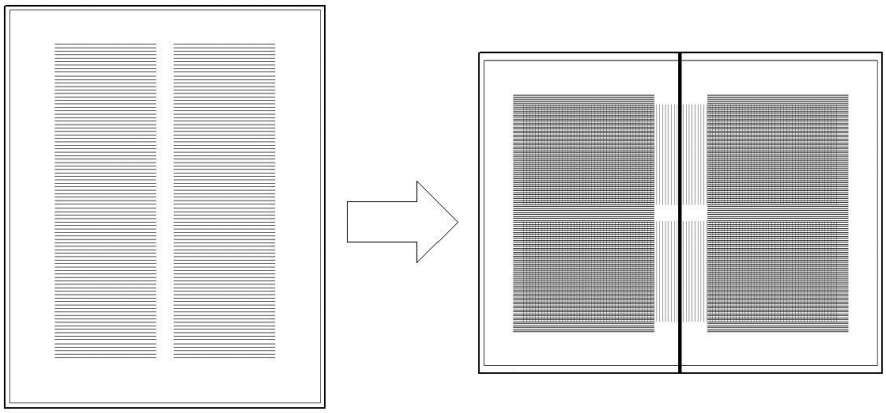
Fig. 14(b): Sin. geo. NF 13, f. 95r joined with NF 55, f. 61r, transmissive image (© St. Catherine's Monastery, Sinai, Egypt)

Whenever a fragment cannot be joined to an existing folio, the identification of the undertext is much more difficult as there is no *a priori* relation between a given overtext and its erased predecessor. In these cases, codicological considerations may be expedient. This is true, for example, for Frg. 73, the remnant of the transitional folio between Sin. geo. NF 13 and NF 55, which must have represented the last folio of quire XVI of the complete Georgian codex. Given that nearly all quires of the codex consist, as quaternions, of eight folios representing four bifolios, Frg. 73 must have been the "partner" of f. 107 of Sin. geo. NF 13, which is the first folio of the quire; cf. the schematical illustration below.



[29] Cf. Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. I, I-23–24 for the identification.
[30] Cf. Gippert, *Caucasian Albanian Palimpsests*, vol. III, IV-48–51 for the undertext of Sin. geo. NF 13, f. 95.

We must consider now that one bifolio of the Georgian codex was normally gained by taking one folio of the palimpsested codex, turned by 90° or 270° (the only exception being the remnants of the Armenian Old Testament codex, NF 55, ff. 48–59 and NF 13, ff. 79–95, and the one folio with Georgian undertext, NF 13, f. 58); this can be illustrated schematically as follows:



On this basis, we may safely deduce for Frg. 73 that it contains, as the upper part of the folio also yielding f. 107, passages from the sixth chapter of John. And indeed, the few characters discernible on its verso (Fig. 15[a]) permit the reconstruction of four lines of John 6:22, which must have been lines 9–12 in the first column of the original folio, just as it was reconstructed in the edition,[31] and with only one complete line missing between them and f. 107r (Fig. 15[b]):

Ms.	Line	John 6.22	Armenian[32]
Fragm. 73v	8	{K}<aen eṭiš e ž̃d bowra>-	*I vaŀiw andr žoŀovorwdn*
	9	h̃ḳe-{h}<ē eṭowx̣own e ç̣ay a>-	*or kayr yaynkoys covown,*
	10	ḳa-å̃a [no]<w>[t]-{a}<naḳe en'eġ>	*tesanēr tʿē ayl*
	11	[nᶜa hē-n] eṭi[š sa] <sao a>-	*naw očʿ goyr and baycʿ miayn*
	12	ṭown ba[h]a-b{åh}[ē h]an{a}<ye>-	*mioyn yor mtin*
	13	<ṭowx̣ḳe e ašarḳeṭowx̣ ỹsi .>	*ašakertkʿn y(isows)i.*
107r	14	<now>{t}-al-baha-båhē ỹs <e a>-	*ew zi čʿēr mteal y(isow)s*
	15	[š]{ar}[ḳ]eṭowġo[xoš i]{čē e nᶜa} ...	*ənd ašakertsn iwr i nawn...*

[31] Cf. Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. II, V-30–33 for the undertext of Sin. geo. NF 13, f. 107.

[32] The Armenian text is collated here as it is much closer to the Albanian than the Greek.

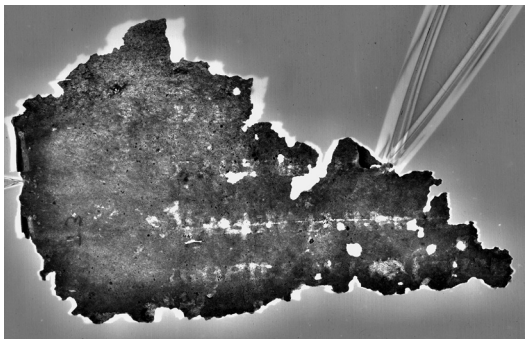


Fig. 15(a): Sin. geo. NF 55, f. 73v, transmissive image (© St. Catherine's Monastery, Sinai, Egypt)

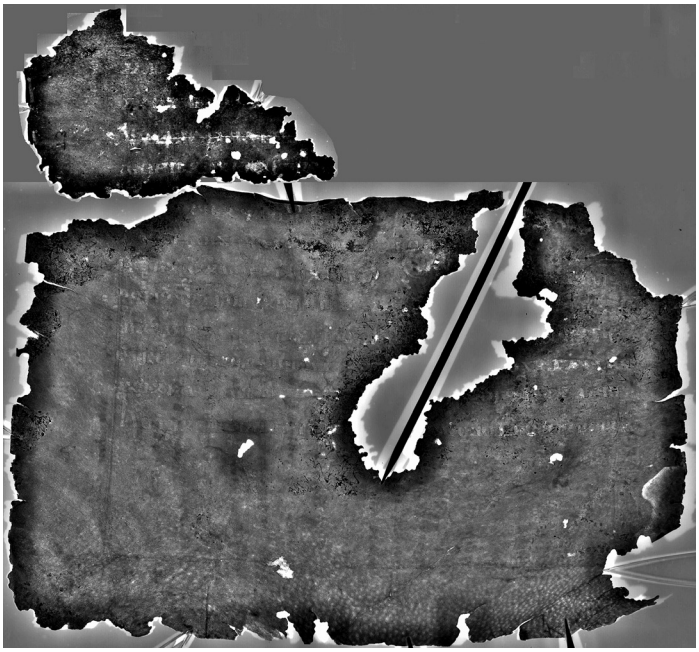


Fig. 15(b): Sin. geo. NF 13, f. 107r joined with NF 55, f. 73v, transmissive image (© St. Catherine's Monastery, Sinai, Egypt)

The same principle also applies to the fragments that cannot be joined to an existing folio, especially those that derive from the first two quires of the Georgian codex (Frg. 60, 63–72, and 75, cf. above). By calculating the separation between the passages of their overtexts (from the *Life of St. Antony*), we not only arrive at identifying Frg. 60 and 75 as parts of the same folio (Fig. 16[a] and [b]) but also at establishing the sequence of the fragments, which is uninterrupted beginning with Frg. 63. We can further calculate the underlying quire structure, with four folios missing at the beginning of the first quire, and one folio at the end of the second one; this implies that six of the fragments of quire II can be joined together as remnants of bifolios. And whenever the undertext of one of the 'partners' can be identified, the undertext of the other 'partner' can also be deduced. As a matter of fact, all seven fragments pertaining to quire II thus prove to stem from the Caucasian Albanian Gospel codex as schematised below.

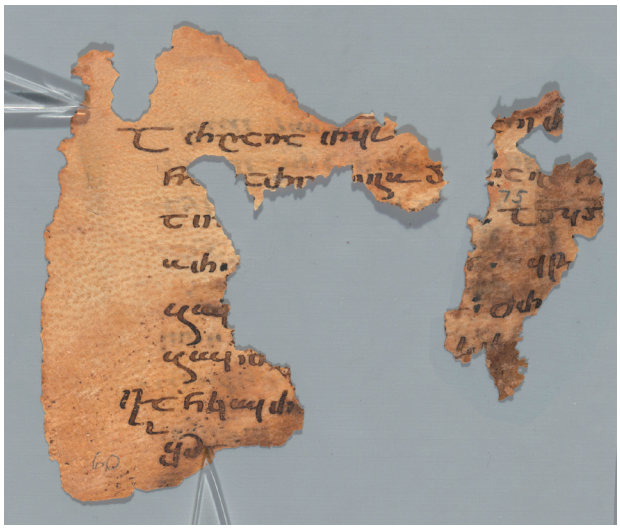
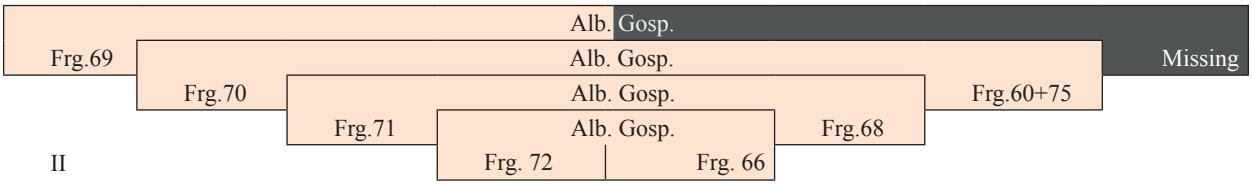


Fig. 16(a): Sin. geo. NF 55, f. 60r joined with f. 75v (© St. Catherine's Monastery, Sinai, Egypt)

Fig. 16(b): Sin. geo. NF 55, f. 60v joined with f. 75r (© St. Catherine's Monastery, Sinai, Egypt)



As an example, the undertext of Frg. 70r is reconstructed here (Fig. 17[a]), which can be identified as representing John 6:63–65 on the basis of the transmissive light image (Fig. 17[b]):

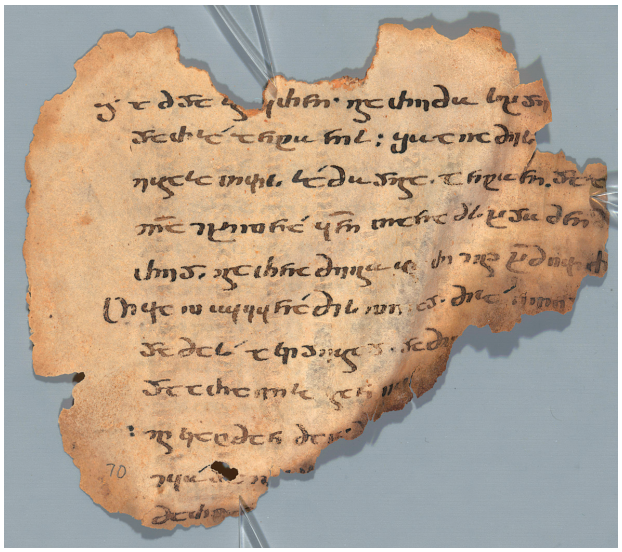


Fig. 17(a): Sin. geo. NF 55, f. 70r
(© St. Catherine's Monastery, Sinai, Egypt)

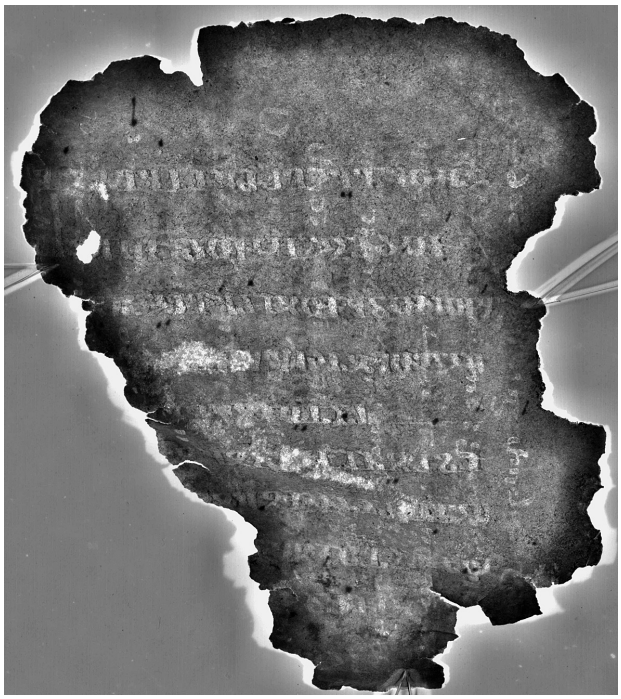


Fig. 17(b): Sin. geo. NF 55, f. 70r, transmissive image
(© St. Catherine's Monastery, Sinai, Egypt)

Line	Frg. 70r	John 6:63–65 (Armenian)
		Hogín ē kendanawor,
1	marmin'en šel hil' now-ba '	*marmin inčʿ očʿ awgnē.*
2	[E] {il'}[owx̣] zow pē-hˇk̦e-zow-	*Zbansn zor es xawsēcʿay*
3	-<vˢ>[as] hel-ne-ya own ġowyown '	*ənd jez, hogí ē ew keankʿ.*
4	<Sa b>{ow-ne} [ži]n vˢax̣[oc] h[å]-	*Aył en omankʿ i jēnǰ*
5	<ya-n-aha>-[n-hanay]åˇr[k̦e ']	*or očʿ hawatan.*
6	<Eṭ'ˇneš aa>-{a}na[k̦e-hē yˇs]a eś{e}-	*Kʿanzi gitér y(isow)s i skz-*
7	<xosṭay> {h}ana[yåˇr]k̦e [åˇr hē]	*banē ov en aynokʿik*
8	<håya-n-aha-n-h>[a]nayåˇrk̦e {own}	*or očʿn hawatan. Ew*
9	<o hašk̦e-hē ta>-{da}ġeso{wn}-	*ov ayn ēr or matne-*
10	<hanayoen>{k̦e}-hē [o]{o}<w>-	*locʿn ē z-*
11	<x̣-al '>	*na.*

The undertext of the verso (Frg. 70v) is much harder to establish, given that it is on a hair side, for which transmissive light imaging usually does not work. On the basis of the new multispectral images, it can nevertheless be identified as beginning with John 6:49–50, which means that it was originally the recto (Fig. 17[c]):

Line	Frg. 70v	John 6:49–50
1	Derġo[n] bʿ[efi k]ay-n[e] {e}	*Harkʿn jer keran*
2	manan[a k]ʿaba[n]a[x̣] {p̣owri}-<ne '>	*zmananayn yanapatin. Ew meṙan.*
3	E[e-ne ś]ow[m ć]ow[dowa]{x̣}<oc>	*Ays ē hacʿn or erknicʿ*
4	[aci-b]{åhē}-[h˜]ḳe ' o[wk]{a}-<hanay>-	*iǰeal ē zi or owticʿē*
5	{o}e[nḳ]e etx̣[o]{c} [no]{w}<t-anḳe>-	*okʿ i smanē mi*
6	-[va-bil'al ']	*meṙanicʿi:*

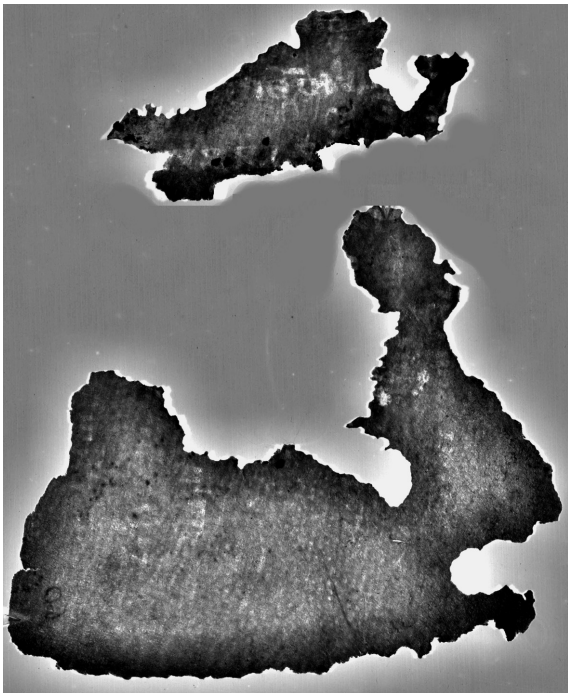


Fig. 16(c): Sin. geo. NF 55, f. 60r joined with f. 75v, transmissive image (© St. Catherine's Monastery, Sinai, Egypt)

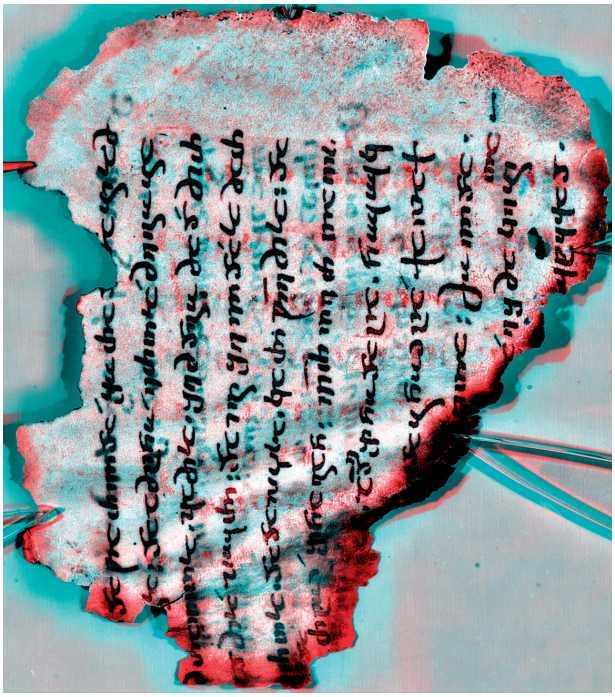


Fig. 17(c): Sin. geo. NF 55, f. 70v, multispectral image (© St. Catherine's Monastery, Sinai, Egypt)

Considering the extent of the visible margins of Frg. 70v, we may further assume that the text it contains represents the beginning of the first column, i.e., the upper left corner of the original recto, whereas the text of Frg. 70r represents the first lines of the second column of the original verso. For the complete folio underlying it, we may thus estimate that the text covered John 6:49–67, the folio fitting exactly between Sin. geo. NF 13, ff. 99+98 (with John 6:27–48) and Sin. geo. NF 55, ff. 17+22 (with John 6:67–7:17).[33] For the 'partner' of Frg. 70 represented by Frg. 60 + 75, this implies that it must have belonged to the lower half of the original folio, with its 'verso' continuing the text of Frg. 70r. As Frg. 60 appears to be empty (Fig. 16[c]), it is likely to be a remnant of the lower margin, which was rather broad in the Albanian Gospel codex; the letters visible on Frg. 75v (cf. ib.) must then belong to the last lines of the column in question. If this was the same (second) column as on Frg. 70r, the characters must have belonged to John 6:66 and 67, and indeed, the text passage can be reconstructed as follows:

[33] Cf. Gippert *et al.*, *Caucasian Albanian Palimpsests*, vol. II, V-34–37 for the undertext of Sin. geo. NF 13, ff. 99+98 and V-38–41 for the undertext of Sin. geo. NF 55, ff. 17+22.

Line	Frg. 75v	John 6:66–67 (Armenian)
19	<ķor-hē-n-å˜r no>{w-h}[o]{ro}-<iġa>-	*yets . ew očʿ ews šrǰecʿin*
20	-<n-å˜r-hē hi>{m}[i] oow[xo]<š '>	*ənd nma.*
21	<Pē-ne y˜n e ṗ>açar a{ša}<rķe>-	*Asē Yisows cʿerkotasan ašakertsn*

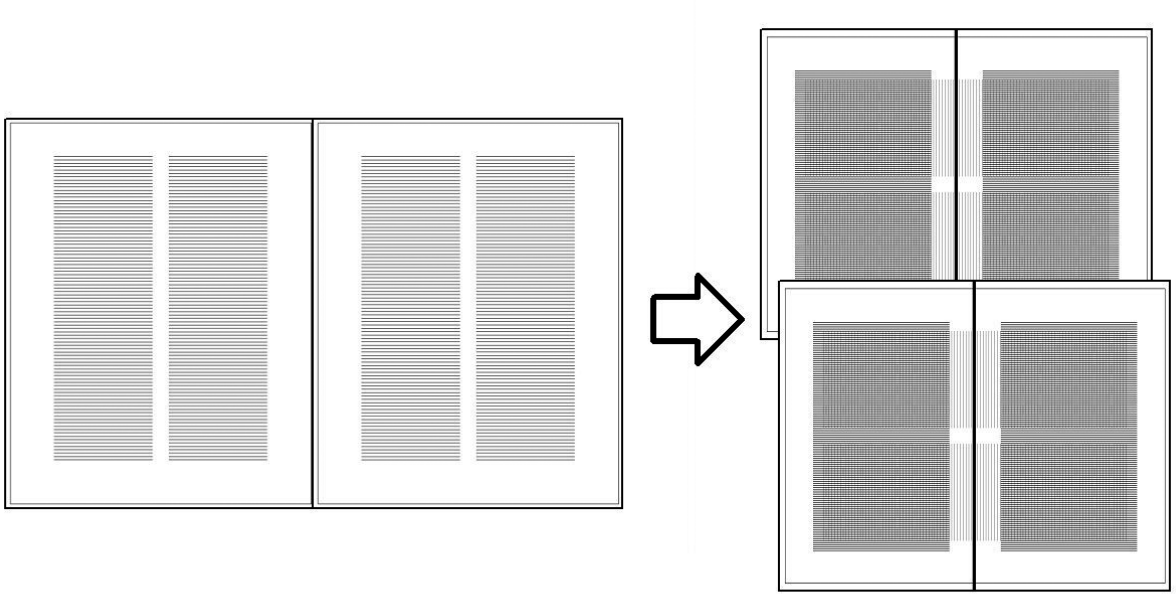
On the basis of all these identifications, we can now reconstruct the original codex containing the Gospel of John in Caucasian Albanian with much better reliability than ever before.[34] We may safely state that it consisted of six quaternions, of which only the last one is represented *in toto* in the palimpsest, and that the first folio must have been empty (or filled with other materials, e.g., a chapter index). The reconstructed quire structure is illustrated in the table below, with A denoting Sin. geo. NF 13 and B denoting Sin. geo. NF 55.[35]

I															
(*vacat*)		1.1–24		1.24–45		1.45–2.15		2.15–3.9		3.9–27		3.28–4.11		4.11–31	
		A40r	A40v			A6r	A6v	A7r	A7v			A41r	A41v		
		A47v	A47r			A1v	A1r					A46v	A46r		
II															
4.32–48		4.48–5.17		5.17–35		5.35–6.9		6.9–27		6.27–48		6.49–67		6.67–7.17	
B18r	B18v	B69v	B69r	A100r	A100v	A101r	A101v	B73r	B73v	A99r	A99v	B70v	B70r	B17r	B17v
B21v	B21r			A97v	A97r	A96v	A96r	A107v	A107r	A98v	A98r	B60r+75r	B60v+75v	B22v	B22r
III															
7.18–36		7.37–8.14		8.14–31		8.32–50		8.51–9.9		9.9–27		9.27–10.6		10.7–26	
B68v	B68r			A19r	A19v	A50r	A50v	A51r	A51v	A18r	A18v	A74r	A74v	B66v	B66r
B71r	B71v			A20v	A20r	A55v	A55r	A54v	A54r	A21v	A21r	A102v	A102r	B72r	B72v
IV															
10.26–11.7		11.7–30		11.30–47		11.48–12.6		12.6–26		12.26–44		12.44–13.11		13.11–28	
		A65r	A65v			B12r	B12v	B11r	B11v	B54r	B54v	A66r	A66v		
		A60v	A60r			B9v	B9r	B10v	B10r	B55v	B55r	A59v	A59r		
V															
13.28–14.7		14.7–24		14.24–15.13		15.13–16.5		16.5–22		16.22–17.6		17.6–25		17.25–18.16	
						A30r	A30v	A31r	A31v						
						A25v	A25r	A24v	A24r						
VI															
18.16–31		18.32–19.7		19.7–22		19.23–38		19.38–20.15		20.15–29		20.30–21.16		21.16–25+col.	
B40r	B40v	A61r	A61v	A17r	A17v	B13r+77r	B13v+77v	B14r+78r	B14v+78v	A16r	A16v	B1r	B1v	B39r	B39v
B35v	B35r	A64v	A64r	A22v	A22r	B8v	B8r	B7v	B7r	A23v	A23r	B5v	B5r	B36v	B36r

[34] For previous attempts cf. Gippert, The Albanian Gospel Manuscript – New Findings, 62 and Gippert, When Person Overcomes Class, 39.

[35] In the table, a yellow background indicates the position of the new fragments; a green one, folios whose content has now been identified differently from the edition of 2009; and a grey one, missing parts.

This reconstruction builds upon one further, decisive, observation: as the table shows, folios that are adjacent in the Georgian *codex rescriptus* are usually distributed symmetrically within the quires they originally belonged to. For example, we find ff. 40 and 41 of Sin. geo. NF 13 as the second and seventh folio of the first quire, and ff. 6 and 7 as the fourth and fifth. This means that both these pairs represent one bifolio each of the original codex, which presupposes that in the reuse, the original bifolios were still coherent so that the two folios they consisted of could be used one after another as illustrated below. It is this structural precondition that forces us to assume that the first folio of the codex did not contain text of the Gospel.



LOOKING AHEAD

Only one of the 'new' fragments that is likely to stem from the Gospel codex, viz. no. 63 (Fig. 18[a] for the 'recto'), cannot immediately be assigned a place in the reconstructed Gospel codex, because the visible traces, even in the transmissive light image (Fig. 18[b]), are insufficient to determine its contents with certainty and because it has no 'partner'. According to the overtext, it must be a remnant of the fifth folio of the first quire of the Georgian *codex rescriptus*, whose counterpart would have been the fourth folio, lost together with the ones preceding it, and it must represent the outer corner of the top half of the folio it represents. On the basis of this, we may estimate that Frg. 63r contains John 4:15–18 in its undertext, thus representing a part of the last folio of the first quire of the Albanian Gospel codex; cf. the tentative reconstruction of the eight lines it exhibits:

Line	Frg. 63r	John 4:15–18 (Armenian)
	<nowt-anḳe-he>-	*ew mí e-*
1	<ġal-zow e>{t}[iš] {he-b}o[ḳ]al-	*kicʿ aysr hanel*
2	-<zow xe '>	*ǰowr.*
3	<Pē-n-aġ>{ow}[s y˜]n o[w]{k}[al pa]-{n˜n}	*Asē cʿna Yisows: ertʿ kočʿea*
4	<owsbos> {v}[ē ' h]ekal-n˜[n] {eṭ^iš '^}	*zayr kʿo ew ék aysr.*
5	<IĺIow-ḳor-b>[i]yay-n-oow a [xi]-	*Patasxani et nma kinn*
6	<%e pē-n-aġe>{n '} te-bezi-va {'}	*ew asē: čʿikʿ im ayr.*
7	<Pē-n-aġows y˜n> {ē}-n˜n-{p}ē {te}-	*Asē cʿna Yisows: barwókʿ asacʿer*
8	-<bezi-va-ḳa ' x>{o} owsbo <ta>-	*tʿe čʿikʿ im ayr. zi hing ayr*
9	<batkē-n˜n . …>	*pʿoxeal ē kʿo …*

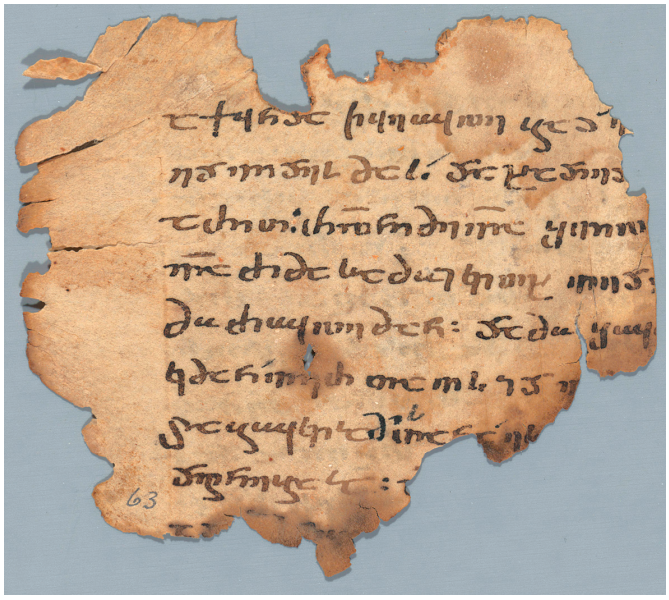


Fig. 18(a): Sin. geo. NF 55, f. 63r
(© St. Catherine's Monastery, Sinai, Egypt)

Fig. 18(b): Sin. geo. NF 55, f. 63r, transmissive image
(© St. Catherine's Monastery, Sinai, Egypt)

For the remnants of the seventh and eighth folios, represented by fragments no. 65 and 67, the content can more easily be determined: with passages from Ephesians (5:29 and 4:11–15) and Galatians (4:4–6), they belong to the Albanian lectionary codex, continuing the text of Sin. geo. NF 13, f. 27r, which ends with Eph. 5:29.

The small Frg. 64, whose undertext is from the Armenian New Testament, came as a surprise. The five lines it reveals on its recto (Fig. 19[a] and [b]) turned out to contain the beginning of Heb. 11:35, the final words of which appear in the first lines of the undertext of the bifolio consisting of Sin. geo. NF 13, f. 62v and f. 63r (Fig. 20[a] and 21[a]). For two reasons, Frg. 64 nevertheless cannot belong to a folio immediately preceding these. First, the hand and style is totally different (thin and strongly slanted in ff. 62 and 63, rather bold and upright in Frg. 64). Second, the content of the verso of Frg. 64 is Heb. 12:3–5 (Fig. 19[c] and [d]), which is also contained in Sin. geo. NF 13, ff. 63v+62r (Fig. 20[b] and 21[b]). We thus have two different witnesses to the same text passage here, with only one minimal orthographical difference (the *shewa* vowel spelt out in *mełacʿən* 'of the sins' after the line break in f. 62rb, 4):

Heb.	Frg. 64v	Sin. geo. NF 13, 63va, 20 – 62rb, 4
12.3	*<jerovkʿ ew lkʿa>nicʿikʿ <·>*	*jerovkʿ ew lkʿani|cʿikʿ ·*
12.4	*<zi čʿewews> areamb*	*zi čʿewews are|amb*
	<čʿapʿpa>terazme-	*čʿapʿpate|razme-*
	<alkʿ> [h]akaṙak kacʿēkʿ	*alkʿ haka|ṙak kacʿēkʿ*
12.5	*<me>[ł]acʿn · || ew mo-*	*meła|cʿən : || ew mo-*

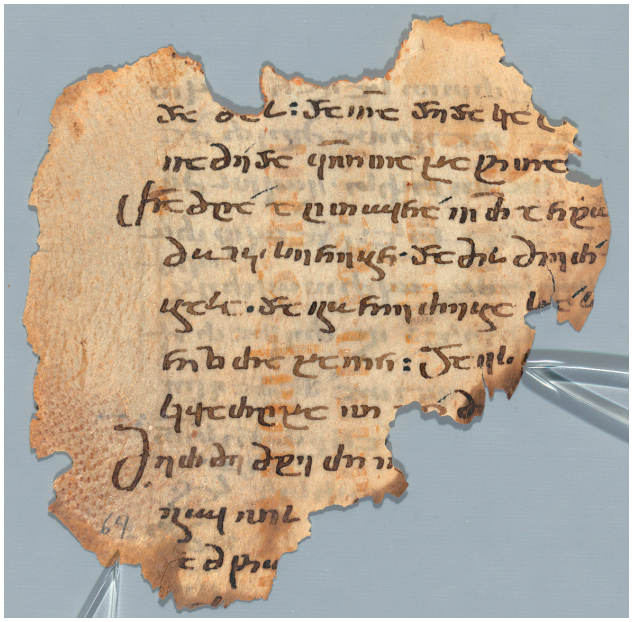


Fig. 19(a): Sin. geo. NF 55, f. 64r
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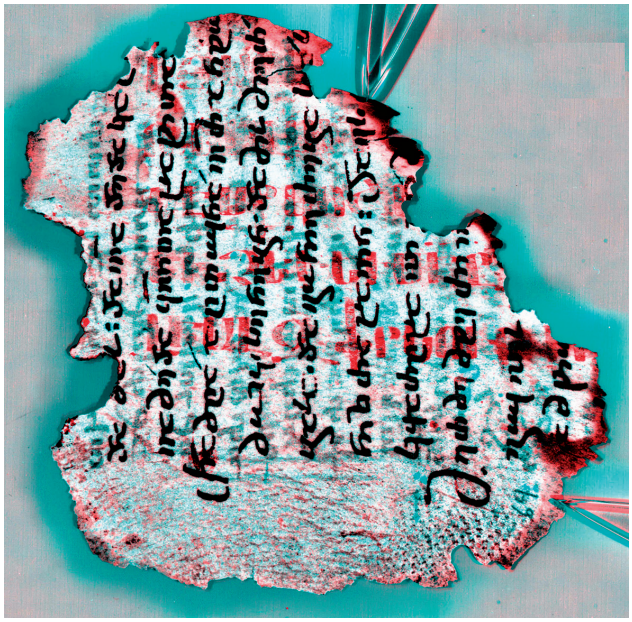

Fig. 19(b): Sin. geo. NF 55, f. 64r, multispectral image
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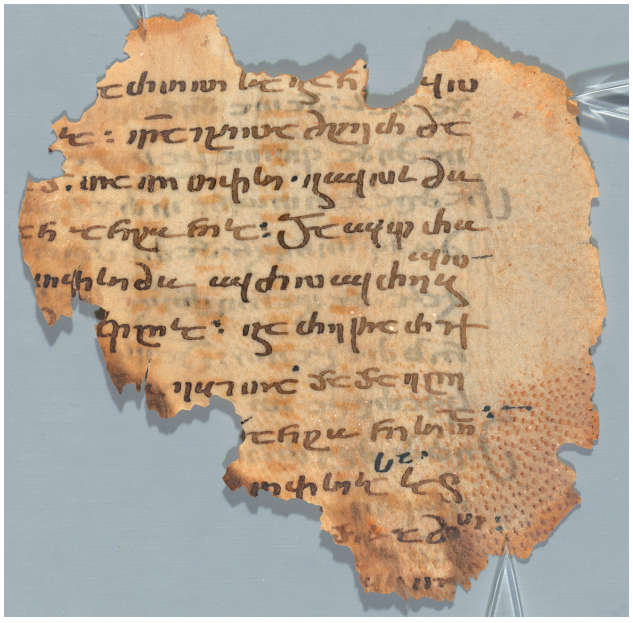

Fig. 19(c): Sin. geo. NF 55, f. 64v
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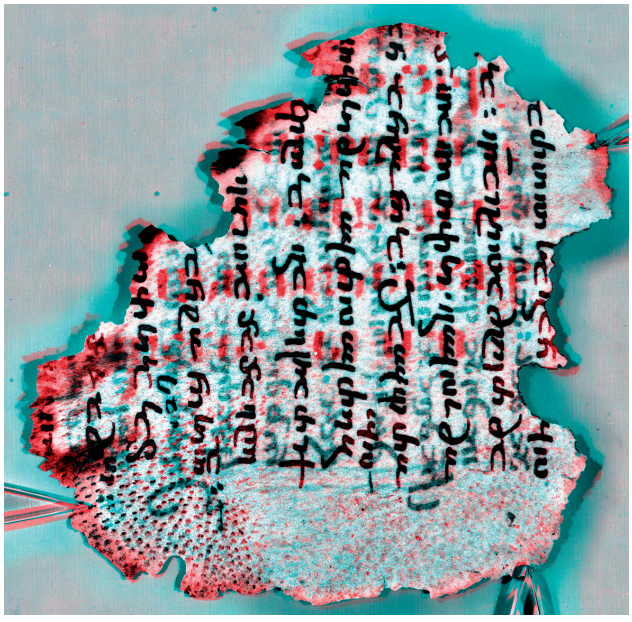

Fig. 19(d): Sin. geo. NF 55, f. 64v, multispectral image
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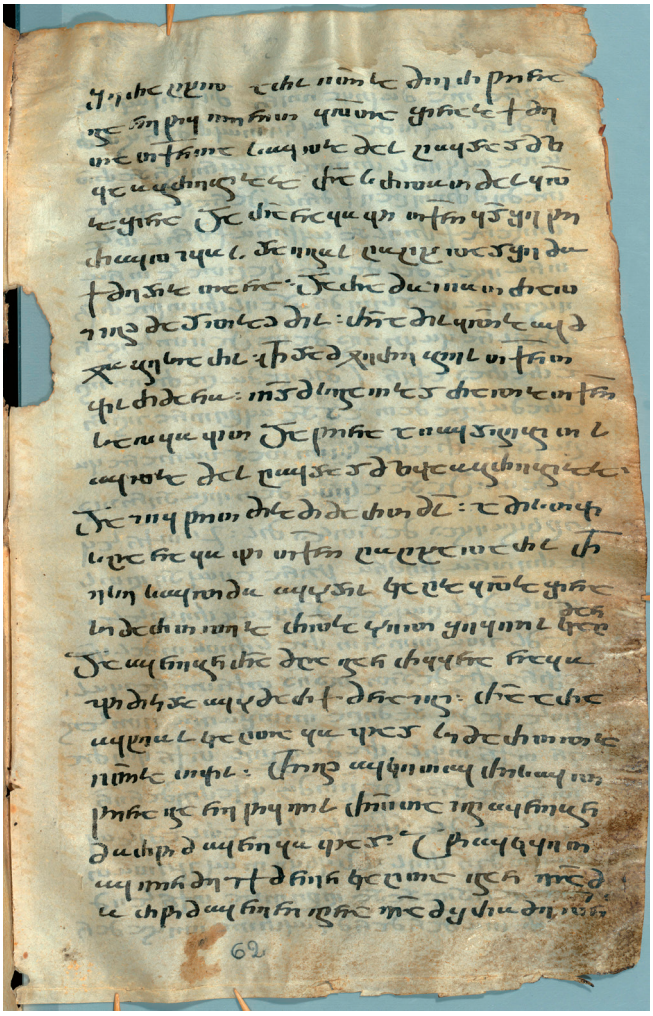

Fig. 20(a): Sin. geo. NF 13, f. 62r (© St. Catherine's Monastery, Sinai, Egypt)

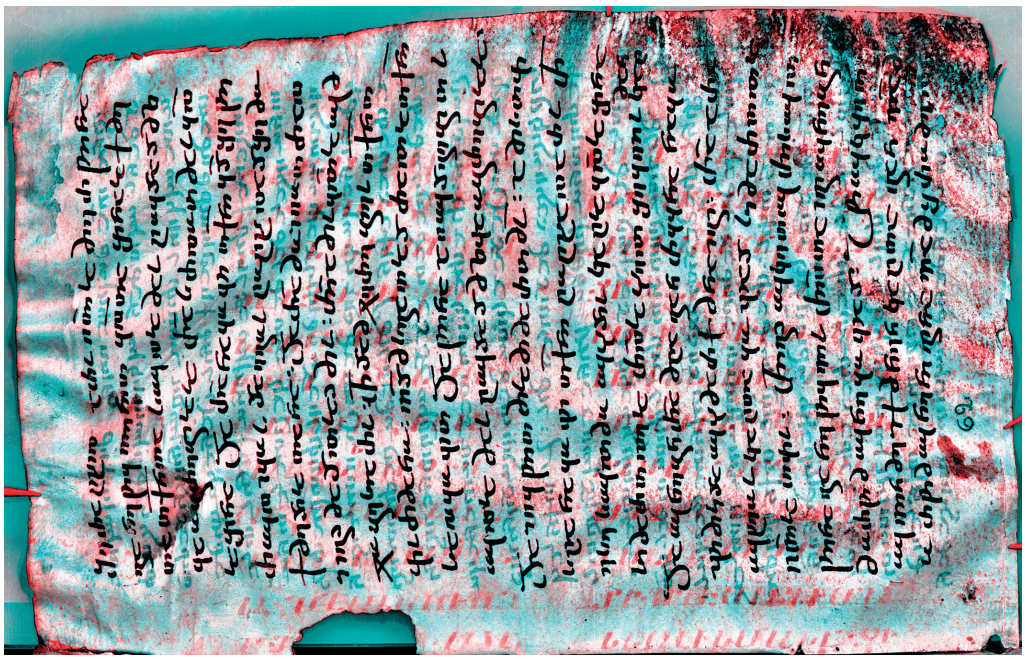

Fig. 20(b): Sin. geo. NF 13, f. 62r, multispectral image (© St. Catherine's Monastery, Sinai, Egypt)

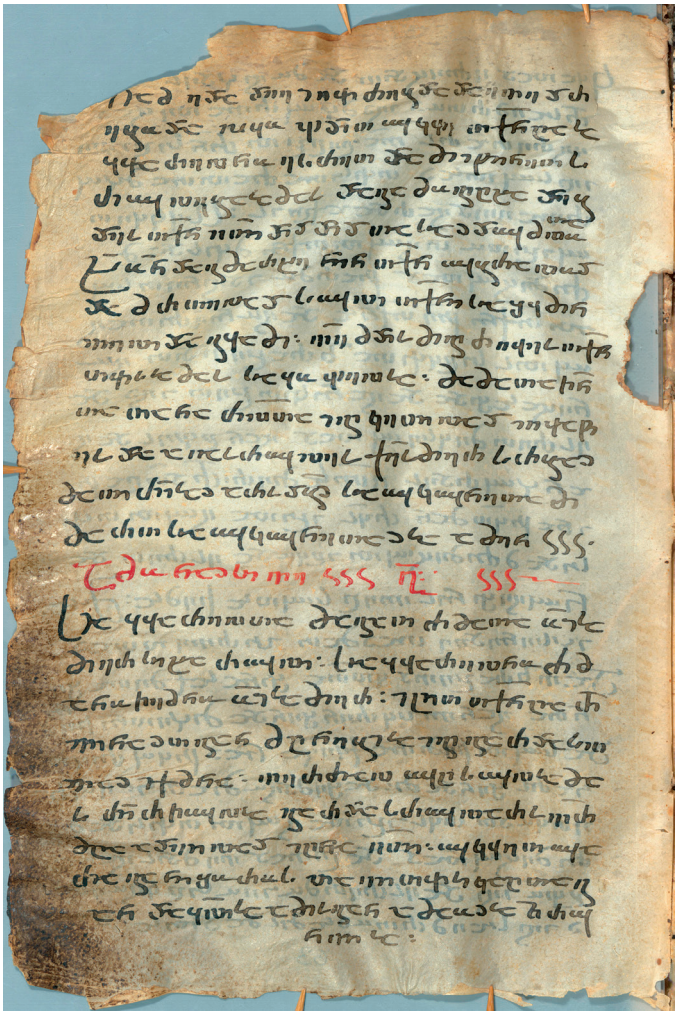

Fig. 21(a): Sin. geo. NF 13, f. 63v (© St. Catherine's Monastery, Sinai, Egypt)

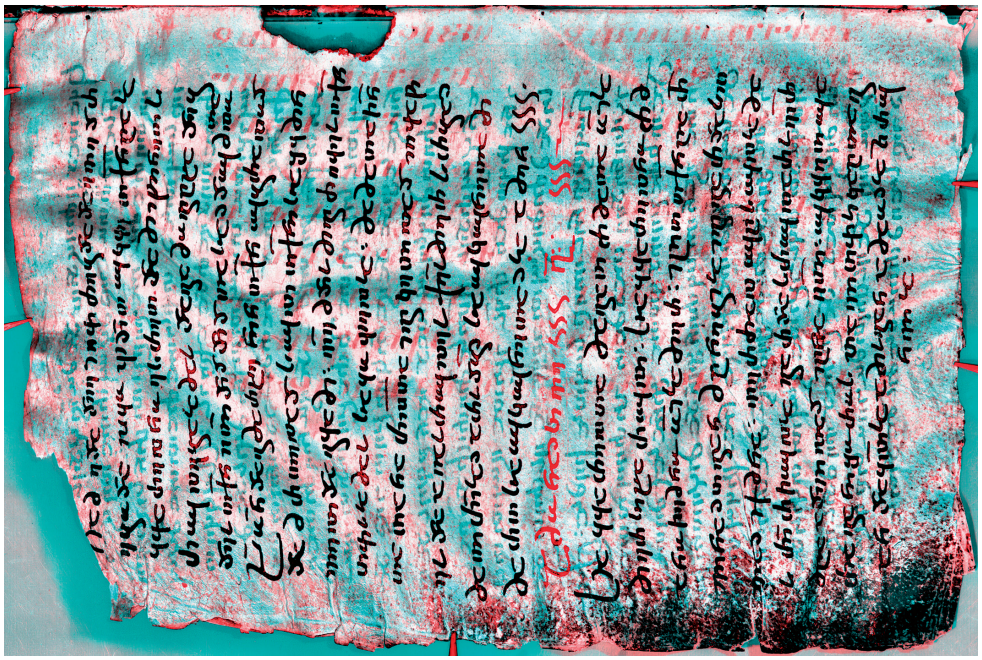

Fig. 21(a): Sin. geo. NF 13, f. 63v, multispectral image (© St. Catherine's Monastery, Sinai, Egypt)

Why have two Armenian versions of the same passage from Hebrews survived side by side in palimpsest form in our *codex rescriptus*? As a matter of fact, they are not even the only palimpsest witnesses of the final chapters of the epistle in Armenian. Another palimpsest of St. Catherine's Monastery, Sin. syr. 7, also contains, on its ff. 47 and 48, an Armenian undertext (in majuscules) consisting of Heb. 10:21–35 and 11:25–38 (Fig. 22[a] and [b] for f. 47v)—the only Armenian undertext in that codex—, and the overlap again proves that this cannot stem from the same original. Outside of Mount Sinai, we find Heb. 11:14–33 in the Armenian palimpsest leaf Mingana Chr. Arab. Add. 124 of the University of Birmingham, yet another witness of the same type.[36]

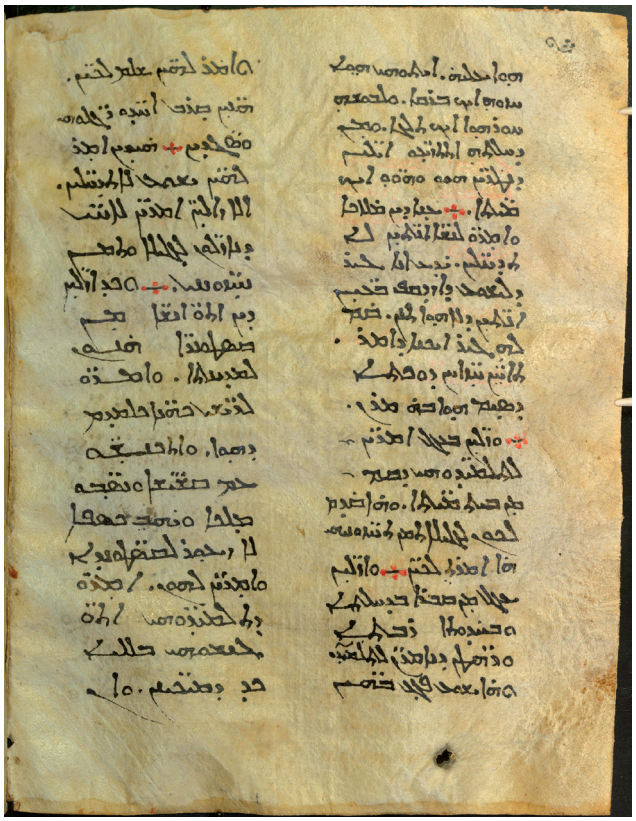

Fig. 22(a): Sin. syr. 7, f. 47v
(© St. Catherine's Monastery, Sinai, Egypt)

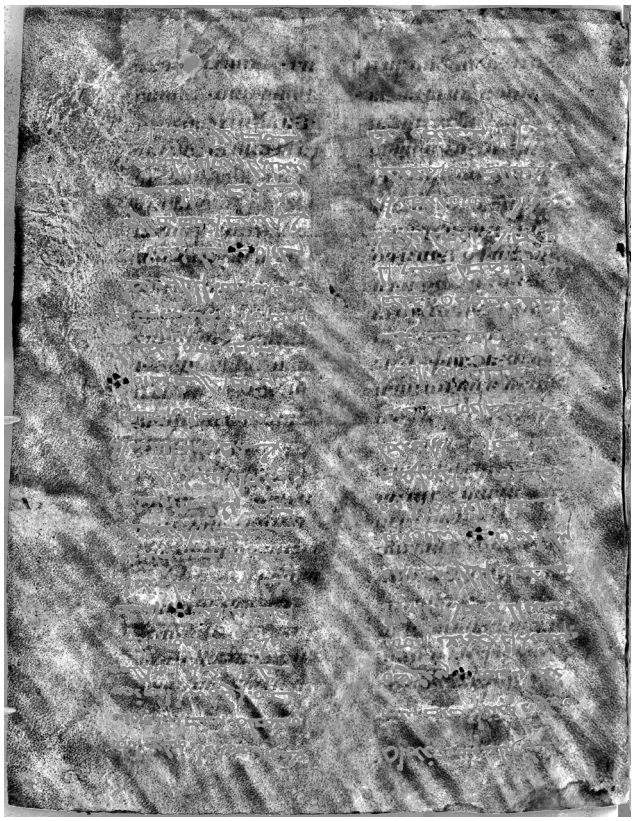

Fig. 22(b): Sin. syr. 7, f. 47v, multispectral image
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What made the end of this epistle so important that it is so often found in erased layers? The reason may be that Hebrews was usually placed at the end of the Pauline epistles, with the final folios being liable to coming loose and then being reused. However, the fact that we find Heb. 11:35–12.5 even a third time in Sin. geo. NF 13 and NF 55, namely, in the Caucasian Albanian undertext of ff. (NF 13) 33, 38, 67, and (NF 55) 42,[37] is merely accidental, given that it here figures among the pericopes of a lectionary, not as part of a praxapostolos-type codex.

[36] Cf. Brock, Palimpsest Fragment, 129–134, and id., *Notes*, 224 with n. 6, who assumes only Heb. 11:15–32. On the webpage displaying the fragment (http://epapers.bham.ac.uk/91/, accessed 01.07.2023), the palimpsest is styled 'a legal text (?) in Armenian'; this information is obviously based upon Mingana, *Catalogue*, 20, which states under no. 166: 'Under-Writing: Not Biblical. Possibly the fragment of a legal code'.

[37] Cf. Gippert, *Caucasian Albanian Palimpsests*, vol. III, I-7 for a comparative account of the Armenian and Albanian undertexts.

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[38] https://www.csmc.uni-hamburg.de/news/2022-04-06-delicate.html (accessed 01.07.2023).

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Heinz Miklas

‘Excavating’ the Palimpsests in the Glagolitic Manuscripts from Sinai

PRELIMINARY OVERVIEW

St. Catherine’s Monastery holds about 81 Slavic manuscripts, of which more than half were discovered in the great ‘new’ find of 1975.[1] How many were once preserved there and have been scattered among various other monasteries and public libraries, we cannot yet tell. The oldest group of the Slavic manuscripts, altogether seven, are those written in the earliest Slavic script, Glagolitic, and derive from the 10th to the 11th century, thus belonging to the Old Church Slavonic corpus. It is interesting to note that the boundary between them and the Cyrillic manuscripts coincides almost exactly with the turn from the 11th to the 12th centuries, although the Cyrillic writing system had already been in use since the late 9th century.

So far, in eight or nine of these manuscripts (including one kept in St. Petersburg today, the Oktoechos-palimpsest, RNB Q.п.I.64, and one possible ‘candidate’ in the Vatican Library, the *Gospel-Codex Assemanianus*, Vat. slav. 3) traces of up to 12 palimpsests have been discovered,[2] the overwhelming majority in the Glagolitic manuscripts: two Glagolitic undertexts under a Cyrillic overtext (the Aprakos-palimpsest in Sin. slav. 39, f. 45r,[3] and the aforementioned Oktoechos-palimpsest[4]), and approximately eight under a Glagolitic overtext (in the new part of the Sinaitic Psalter, Sin. slav. NF 2, the second part of the Sinaitic Liturgiarium, Sin. slav. NF 5, the Medical Folia and, it seems, also in Demetrius’ Psalter and the *Codex Assemanianus*). Among the latter we find four Glagolitic undertexts, one or two Latin, two most likely Cyrillic but possibly Greek, and one which cannot be identified.

To understand these figures, we have to compare them to the total number of Glagolitic manuscripts preserved in different locations. Here, we are dealing with 29 units, about 12 of them with palimpsests or only preserved as palimpsests. Further to those already cited, these are: the Bojana-Palimpsest, RGB Grig. 8;[5] the supplement to the Glagolitic Zographou-Gospel, RNB glag. 1;[6] the Menaion-palimpsest in GIM Xludov 117;[7]

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1 In total, 82, according to shelfmarks, which include parts belonging to the same manuscripts in the Old and the New Collections (for example, the Old and New parts of the Sinaitic Euchologium, Sin. slav. 37 + Sin. slav. NF 1, and the Sinaitic Psalter, Sin. slav. 38 + Sin. slav. NF 2), but omit one small Horologion-fragment which was formerly mistaken as Ethiopic (cf. Glibetić, A New 11th Century Glagolitic Fragment and Miklas, The Graphemic Coordinates), as well as the so-called Medical Folia, which bear no shelfmark of their own, but are kept within Demetrius’ Psalter, Sin. slav. NF 3, after f. 141. Also not included in this number is no. 5 of the Old Collection, which proved to be a Latin Psalter, part of which was also discovered in Sin. lat. NF 1 (cf. the facsimile of the section from the Old Collection in Altbauer, *Psalterium Latinum Hierosolymitanum*; for the section from the New Collection, see Brown, The Bridge in the Desert, 88. Unfortunately, there are still a few quires missing, as Father Justin kindly informed me). The exact and final total will only be available after careful revision of both collections in the monastery. For the time being, see Tarnanidis, *The Slavonic Manuscripts*, and Miklas and Radoslavova, St. Catherine’s Monastery on Mount Sinai, with further bibliography.

2 Cf. the lists of Old Church Slavonic manuscripts and palimpsests in Miklas, Mount Sinai and the Cyrillo-Methodian Heritage, 50–52, and Miklas and Sadovski, Die Struktur des Altkirchenslavischen, 1270–1271 (to which at least the palimpsests in the Medical Folia must now be added).

3 Often called ‘Sinaitic Palimpsest/Fragment’, see Schaeken and Birnbaum, *Die altkirchenslavische Schriftkultur*, 104 (III.2.7).

4 Cod. RNB Q.п.I.64, ff. 1v, 2r, 3v, 5v, 6r, 7v, 8r; see Schaeken and Birnbaum, *Die altkirchenslavische Schriftkultur*, 125 (IV.8).

5 Schaeken and Birnbaum, *Die altkirchenslavische Schriftkultur*, 118 (IV.2).

6 Schaeken and Birnbaum, *Die altkirchenslavische Schriftkultur*, 118 (IV.1). Since the overtext is Glagolitic, it could have been written in the Sinai. This might also be true of the Vienna and Prague Folia, which also show other traits pointing in this direction.

7 While all other Cyrillic overtexts are written by Bulgarian scribes, here we have to do with a late Serbian overtext, see Turilov, Xludovskij glagoličeskij palimpsest and Knjazevskaja *et al*., *Svodnyj katalog*, 657–658, 661 (no. D65). An edition on the basis of new multispectral images is currently being prepared by Elena Uxanova in Moscow, cf. http://press.cosmos.ru/drevneyshiy-slavyanskiy-spisok-rozhdestvenskogo-bogosluzhebnogo-kanona-vnov-obreten-blagodarya (accessed 01.07.2023) and

the palimpsest fragments in Prague (Archives of the Metropolitan chapter of St. Vitus, no. A.LX); and the Vienna Glagolitic Folia (Vind. slav. 136).[8] While this amounts to 41%, at St. Catherine's the ratio is currently about 7 to 10, or 70%! Clearly, this has mainly to do with the Sinaitic provenance of the majority, and the lack of writing material in the desert;[9] but to a certain degree it also seems to apply to all surviving Glagolitic sources, because, mainly as a result of unfavourable Church politics, the old script gradually lost its readership, first in the Moravo-Pannonian region, and then more widely across the Balkans.[10]

RESEARCH HISTORY

Before focusing on certain specimens, we have to emphasize that most of the Glagolitic palimpsests—especially those from the Sinai—share a common feature which significantly hinders their investigation: their undertexts are so thoroughly removed that it requires great effort to identify them, and even then it is often only scattered areas that are discernible. As a consequence, the above statements are still provisional, because not all extant manuscripts have yet been thoroughly analysed,[11] and most of the analysed ones are also in need of further study.

While two palimpsests in the Old Collection at Sinai were already known and partly edited prior to my research,[12] two interdisciplinary projects dedicated to the new Glagolitic finds, funded by the Austrian Science Fund, have made it possible to shed light on the remaining palimpsests.[13] These projects in due course became connected with the Sinai Palimpsests Project (www.sinaipalimpsests.org), led by Michael Phelps, Claudia Rapp and their EMEL colleagues (http://emel-library.org/). Their successful progress enabled us to receive a grant from the Austrian Federal Ministry of Science and Research, and in 2014 to found the Centre of Image and Material Analysis in Cultural Heritage (CIMA).[14] Currently, CIMA forms the basis of our third Glagolitica project,[15] which started in 2017.

The aforementioned projects bring together expertise in three disciplines from three universities: philology from the University of Vienna, computer science from TU (Technische Universität) Vienna, and material chemistry from the Vienna Academy of Fine Arts. For specific tasks we are co-operating with colleagues from other Austrian institutions, as well as institutions in other countries. While the philologists are mainly engaged in the codicology, palaeography, textology, and the editing of the sources, our technical research is in the fields of imaging, image processing and analysis, as well as in the non-invasive analysis of the materials used for the production of the manuscripts.[16]

Uxanova *et al.*, Estestvennonaučnye i tradicionnye metody, where four pages of the palimpsest-quire are already presented (I am grateful to E. Uxanova for sharing the pre-print of the article with me).

[8] Our attempts to analyse the original Prague Folia have not yet succeeded, and our efforts towards closer examination of the Vienna Folia have remained unsatisfactory, because beyond traces of letters they have not produced any readable text.

[9] A similar situation can be observed with the Coptic manuscripts in Egypt.

[10] So far, however, we have no indication that Glagolitic texts shared the fate of Arian Gothic, considered heretical, although Glagolitism was for some time associated with the Gothic tradition in parts of Croatia, cf. Katičić, *Literatur- und Geistesgeschichte*, 477–480. Rather, the small number (so far, four) of examples of Glagolitic palimpsests under non-Glagolitic overtexts seem not to differ from those under Glagolitic overtexts; thus, it appears to have primarily depended on the *hic et nunc*-need to preserve a Glagolitic text (or exemplar), whether it was recycled or not.

[11] In the new Sinaitic Glagolitic collection this applies to the Menaion (Sin. slav. NF 4) and the Horologion fragments.

[12] The Aprakos (see Altbauer and Mareš, Fragmentum glagoliticum) and the Oktoechos Palimpsest (see Lunt, On Slavonic Palimpsests).

[13] See https://cvl.tuwien.ac.at/project/the-sinaitic-glagolitic-sacramentary-euchologium-fragments/ and https://cvl.tuwien.ac.at/project/the-enigma-of-the-sinaitic-glagolitic-tradition-2/ (accessed 01.07.2023).

[14] See Miklas and Rapp, The Centre of Image and Material Analysis, Frühmann *et al.*, Interdisziplinäre Studien and https://hrsm.cvl.tuwien.ac.at/ (accessed 01.07.2023).

[15] FWF stand-alone project no. P29892, cf. https://cvl.tuwien.ac.at/project/the-origin-of-the-glagolitic-old-church-slavonic-manuscripts/ (accessed 01.07.2023). For the kind permission to work with St. Catherine's manuscripts and the assistance we have received in our lengthy endeavours we express our sincere thanks to His Eminence Archbishop Damianos and the community of St. Catherine's, especially the librarian Father Justin, and Father Nilus (who helped us most willingly during the former's absence), as well as our dear colleague Ioannis Tarnanidis, who paved the way for our studies on the subject. All this would not have been possible, however, without the continuing support of the Austrian Science Fund (FWF).

[16] For example, our internet editions are being handled by our Russian colleagues under Victor Baranov, cf. the electronic collection of Sinaitic Glagolitic Manuscripts under http://mns.udsu.ru/mns/portal.main?p1=55&p_lid=2&p_sid=1 (accessed 01.07.2023);

PALIMPSEST SPECIMINA

Now, let us return to the palimpsests. It was in the Glagolitic Liturgiarium, Sin. slav. NF 5,[17] that I observed the first undertext, during my first visit to St. Catherine’s in 1996.[18] Being fully occupied with its overtext, I only noted that between the lines or, more often, along the same lines, there was a lower Glagolitic script, whose rounded ductus resembles the Bulgarian hand of the upper layer (Fig. 1). And since the latter may be ascribed to the second quarter of the 11th century, the undertext could be as late as the 10th century.

Later, when the Sinai Palimpsests Project supplied me with new multispectral images, I not only discovered further folios with undertext,[19] but also a majuscule line in the middle of f. 24v, which seemed to represent a headline in the same layer rather than a passage of a further underlayer (Fig. 2). More recently, thanks to additional processed images produced by the Sinai Palimpsests Project, some Cyrillic passages have become visible on f. 32v (Fig. 3), and a drawing (illustration?) on f. 68r. These support my hypothesis that we are dealing with a double palimpsest, as in the case of f. 70v. But, as the reproductions illustrate, it is extremely difficult to establish any more than this, as the manuscript was not only almost completely deprived of its previous texts in the course of (possible multiple)[20] erasure, but has also suffered seriously in recent times, as comparison with its well-preserved Petersburg fragment indicates.[21]

This is even more true of two other Sinai Glagolitic manuscripts, the so-called Psalter of Demetrius (Sin. slav. NF 3) and the Medical Folia—three small bifolios which Ioannis Tarnanidis found in the Psalter and left without any shelfmark of their own. On three recto-sides, this remarkable ternio contains the oldest medical prescriptions of Slavonic literature. But let us first turn to the Psalter.

Demetrius’ Psalter is the only manuscript in the collection which seems to have been partly written on reused parchment—just as its cover was made of reused wooden panels,[22]—but does not exibit more than indirect traces of former writing. These indications of its earlier use consist of some remnants of ruling, probable parts of characters and red stains, and a few heavily-erased surfaces where the erasure was executed with a sepia-bone or pumice.[23] Other Sinaitic Glagolitic palimpsests were probably only thoroughly washed off. However, we can observe similar cases elsewhere,[24] which need to be closely examined, as the relevant features might also be the result of cleansing of the original animal skin, rather than the later erasure of an early layer of ink.

Palimpsest traces in the Sinaitic Psalter (Sin. slav. 38 + Sin. slav. NF 2) have so far been discovered only in its new part, Sin. slav. NF 2, and are of interest in so far as they consist of fragments of rounded Glagolitic letters between the lines of overtext. The damage to the Glagolitic lettering has obviously been caused by scratching the pages with pumice or similar means. This reminds us of the Vienna Folia (Vind. slav. 136). Such

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and to broaden the scope of our current project, we have the collaboration of a conservation expert from the Danube University at Krems, as well as microbiologists from the University of Natural Resources and Life Sciences.

17 So far predominantly known under the name ‘Missal’, chosen by Ioannis Tarnanidis in his first description of the new Slavonic finds (Tarnanidis, *The Slavonic Manuscripts*, 103–110). Today we know that it is the main part of the Sinaitic Liturgiarium, the first part of which is represented in the Petersburg ‘Služebnik’ (fragments BRAN 24.4.8 and RNB, glag. 2), previously regarded as a part of the Sinaitic Euchologium, Sin. slav. 37, or as a fragment of a collection of its own, cf. Schaeken and Birnbaum, *Die altkirchenslavische Schriftkultur*, 109 (III.2.10), Knjazevskaja *et al.*, *Svodnyj katalog* 61 (nos. 34, 35), Parenti, The Krylov-Uspenskij Folia, and Miklas *et al*., Preliminary Remarks, 43–44 (especially fn. 84), 62.

18 See Miklas, Zur editorischen Vorbereitung, 125–126.

19 So far the following folios have been recognized as palimpsested (numbers according to my present folio order): 1r, 1v, 2r, 2v, 3r, 3v, 4r, 4v, 5r, 6v, 7v, 8r, 8v, 11r, 12r, 13v (?), 14r, 14v, 15v, 17r, 17v, 18v (?), 19v, 20v, 21r, 22v, 23v, 24r, 24r, 24v; 27v, 28r, 29r, 30r, 30v (?), 32r, 32v, 33r, 34r, 34v, 35r, 35v, 36r, 36v, 37r, 37v, 38v, 39r, 39v, 40r, 40v, 41r (?), 41v, 42r, 44v, 47v, 50r, 51r, 52r, 53v, 54r, 54v, 55r, 55v, 56r, 56v, 57v, 58r, 59v, 60r, 60v, 61r, 62v, 63r, 63v, 64r, 64v, 65r, 65v, 66r, 67r, 67v, 68r, 68v, 69v, 70v, 71v, 72r. In addition, there are quite a few smaller fragments with possible traits of undertexts: 9y, 16y, 17y, 18y, 19x, 19y, 21y, 22x, 25x, 25y, 32y, 35y, 36x, 36y, 39x, 40x, 40y, 43x, 46y. For colour photographs and further information (on the first group) see the Sinai Palimpsests Research Site (https://sinai.library.ucla.edu/, accessed 01.07.2023) under no. 82.

20 Beyond the aforementioned Glagolitic and Cyrillic traits on some folios (e.g., ff. 13v, 23r, 24v, 32v, 51r, 54r, 68v, 75r), we observe vertical lines which might belong to a second undertext. It is also worth mentioning that on some folios (e.g., ff. 12r, 70v) the Glagolitic undertext runs upside down in relation to the overtext.

21 See the (enlarged) image in Miklas, Die slavischen Schriften, 246.

22 See the images in Miklas (ed.), *Psalterium Demetrii Sinaitici*, 146–149.

23 See Miklas (ed.), *Psalterium Demetrii Sinaitici*, 41 and 74.

24 Cf., e.g., Fig. 1, p. 9 with the example of the manuscript Vind. suppl. gr. 200 in Miklas and Rapp, The Centre of Image and Material Analysis, 9.

traces are easily visible on ff. 31v–32r[25] (Fig. 4), while fainter character-remnants can be made out, for example, on ff. 8v (above line 15), 9r, 12r, 16v, 17r, 31v (passim).

The examination of the Assemani-Gospel only began recently and so far has discovered a few possible traces of earlier writing. If we exclude the tall, handsomely-braided initial in the left lower margin of f. 157v (Fig. 5), because it could also have been added by Pop Stan who wrote a long note not long after it was copied,[26] we are left with such faint traces as on ff. 41v, 50v, 155v, 156v, 157v–158r etc. (Fig. 6), which may partly derive from erased marginal notes.

The Medical Folia represent the most interesting palimpsest case of all. When working with them in St. Catherine's library, neither I nor my first collaborator Velizar Sadovski guessed that we were looking at a palimpsest. Some years later, Dana Hürner suggested we should have a close look at the pictures together, as she had the impression that there might be character-parts scattered across one or two of the pages. Being unable to find a single intact character, we started turning the pages, first by 90 degrees, then upside-down. We then became aware of further ruling-lines, running partly in the same direction, partly crossing each other.[27] This indicated no fewer than three underlayers! When we followed the lines systematically, we discovered a whole phrase in Latin (the first letter of which can be seen in Fig. 7a),[28] and then a few single, rounded Glagolitic letters (Fig. 7b).

The Latin phrase (running perpendicular in relation to the overtext, beginning at the top left corner) seems to be copied in Carolingian style and consists of two abbreviations, the first in the three majuscule letters *STE* for *S(ANC)T(A)E*, the second in the four minuscule letters *ecle* for *ec(c)l(esia)e*. Initially, I thought this might be the incipit of a liturgical text, but what I found in the literature did not seem to fit.

At that time Claudia Rapp invited me to suggest the most important Slavonic palimpsests from Sinai for the next imaging campaign of the Sinai Palimpsests Project. So I asked EMEL to concentrate their efforts on the Liturgiarium and the Medical Folia as being the most intriguing palimpsests, for which I was impatient for more legible results.[29] The information that emerged was worth waiting for. Apart from discovering further palimpsest traces in the Liturgiarium, such as the Glagolitic majuscules, in the Medical Folia I could now make out the Cyrillic (or Greek?) script (Fig. 7c) that had previously been examined without results.[30] Considering the cultural history of the Slavic lands and the situation in St. Catherine's at the time—roughly, the late 9th until the early 11th century,—the sequence of the layers ought to have started with the Latin and ended with the Cyrillic text, but it seems that in fact the Glagolitic is the youngest. The overtext definitely derives from the middle or third quarter of the 11th century.

Interestingly, the new multispectral images hardly disclosed any traces of the Latin phrase which we had discovered on the colour and UV image-series we had made in 2007.[31] Instead, I made out something completely different and unexpected—remnants of miniatures, covering the two pages of the first bifolio (Fig. 8–9), where we had found the Latin characters. If my interpretation is correct—and doubts certainly remain,—then we are dealing with Michael the Archangel on the left (f. 141av), and the Mother of God, in the pose of the Eleousa, on the right (f. 141fr).[32]

This finding opened up another possible interpretation of the Latin phrase. Now it could be taken as the title written at a right angle to accompany the drawing of St. Michael on the same page. Thus, the whole text may have been: 'Sanct(a)e ecclesi(a)e princeps c(a)elestis militi(a)e sanctus Michael Archangelus'.

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[25] Cf. already Mareš and Miklas (eds.), *Psalterii Sinaitici pars nova*, 128, 130.

[26] However, in this case it would have to be explained why only the initial has been (partly) deleted, and not the note? Furthermore, on f. 156v we also observe traces of a similar braided initial or ornamental strip, and it seems rather unlikely that they had penetrated from the neighbouring sheet. As far as I can see, the topic has not been discussed in extant descriptions, cf. especially Džurova *et al*., *Opis na slavjanskite răkopisi*, 60, 65.

[27] See the description and the reproductions in Miklas (ed.), *Psalterium Demetrii Sinaitici*, 124–125, 301.

[28] For a full reproduction see Miklas (ed.), *Psalterium Demetrii Sinaitici*, *ibid*.

[29] It is my pleasure to thank Claudia Rapp, Mike Phelps, and the team of the Sinai Palimpests Project, for letting me participate in the project and providing me with the images mentioned above.

[30] For coloured photographs and more detailed information see the Sinai Palimpsests Research Site (https://sinai.library.ucla.edu/) (accessed 01.07.2023) under no. 52.

[31] Miklas, Zum Gang der Erforschung.

[32] Actually, examining the older pictures again, I noticed that I could have discovered the drawings already earlier, but since in order to see characters I magnified the pictures on the screen, I was unable to make out larger entities.

Even if we cannot be sure that this reading will hold,[33] the presence of Latin traces needs to be explained. What could be their origin? The Sinai? Possibly. But there is at least one other possibility. In order to find it, we have to consider the manuscript as a whole. The palaeography, language, and content of the reinscribed text suggest that either the scribe or (one of) his template(s) derive from Istria,[34] where in the relevant period all three of the relevant scripts were in use. So we must ask, in which context do the Latin traces belong? For an answer, we need to look at the place of Latin in the Glagolitic Sinaitica in general.

LATIN TRACES

While the Church Slavonic tradition until the turn of the 11th/12th century only reveals Latin influences in exceptional cases and in specific contexts, here we observe the opposite: these Glagolitic manuscripts are full of different Western elements, including Latin. This gives us scope to create an entire typology. Leaving aside elements in the decorative schemes,[35] we find Latin interferences in:

Palaeography

Both the Medical Folia[36] and the book in which they came down to us, the Psalter of Demetrius, exhibit Latin minuscule forms and punctuation elements, which coincide with certain linguistic features and can best be linked to the Beneventana in Dalmatia.[37] The monk-priest from whom the Psalter received its name inserted a tripartite Greek-Latin-Glagolitic *abecedarium*, whose first two parts are mainly composed in majuscules that clearly resemble his Cyrillic letters. But in order to become acquainted with the Latin minuscule script, he apparently asked a contemporary to add a minuscule alphabet as a learning pattern on the next folio.[38] An early result of his writing exercises may be the unfinished alphabets on f. 9v of the main part of the somewhat older Sinai Psalter, Sin. slav. 38.[39] I have tried to compare all these Latin minuscule forms with those of Latin manuscripts in St. Catherine's with specific local traits that were available to me,[40] but the correlations with the Carolingian tradition (also widespread in the Western Balkans) seem to be stronger. Thus, even the Slavic manuscripts contribute to the colourful diversity of the Sinaitic Latin tradition, whose features can be traced from Insular and mainland Europe (such as Visigothic, Luxeuil, Carolingian and Beneventan) to North Africa and Palestine, where they were influenced by other traditions.[41]

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[33] The main counter-argument may be seen in the ruling scheme which the Latin phrase follows, since it fills the entire page; but this argument can be undermined on the assumption that the ruling scheme was used predominantly for the reverse side.

[34] See Miklas (ed.), *Psalterium Demetrii Sinaitici*, 34–37, 125–126, Miklas and Hürner, Westliche Elemente, 311–312, and Miklas *et al*., Preliminary Remarks, 44, 51–53, 56.

[35] So far, Latin influence in the decor has mainly been seen in the Glagolitic *Codex Marianus* of the late 10th c., cf. *inter alia* Vasiljev, Portreti svetitelja. E. Uxanova recently discovered a large, Beneventan-style Latin initial in the Glagolitic Xludov palimpsest (GIM, Xludov 117) of the 11th century, which may be connected with a Latin palimpsest in the same codex (according to her, written in the second half of the 10th or the beginning of the 11th century in Southern Italy); see Uxanova *et al*., Estestvennonaučnye i tradicionnye metody, 16–24 (with illustrations). Linguistically the scribes of the Marianus and the Glagolitic Xludov palimpsest derive from the South Western Balkans; whether the manuscripts were also written there is less certain.

[36] Miklas (ed.), *Psalterium Demetrii Sinaitici*, 121, 123, 124, 126 (commentary), 130 (plate).

[37] For the mentioned peculiarities in Demetrius' Psalter see Miklas (ed.), *Psalterium Demetrii Sinaitici*, 89, 108, 112 (plates) and 49, 50–51, 62 (commentary) as well as Miklas and Hürner, Westliche Elemente, 303–304; cf. also Miklas *et al*., Preliminary Remarks, 39 fn. 62, 42 fn. 80, 50. In discussions with Michelle Brown, however, I learned that the relevant palaeographic specifics seem not be exclusive to the Beneventan tradition, though Beneventan examples can also be found in St. Catherine's library (cf. Brown, The Bridge in the Desert, 91–92 with pl. 3b).

[38] See the reproductions of the *abecedaria* in Miklas (ed.), *Psalterium Demetrii Sinaitici*, 63, 73 and Miklas *et al.*, Preliminary Remarks, 83 (Fig. 6–7) as well as the comments in Miklas and Hürner, Westliche Elemente, 313 and in Miklas *et al*., Preliminary Remarks, 28, 44, 50.

[39] See Miklas *et al*., Preliminary Remarks, 49–50, 88 (Fig. 15).

[40] Especially the chronologically-proximate Latin parchment psalter (*olim* Sin. slav. 5), whose palaeography has puzzled investigators (see Lowe, An Unknown Latin Psalter; Vezin, À propos des manuscrits latins; Vezin, Les manuscrits latins du Sinaï; Brown, Imagining, Imaging, and Experiencing the East, 77; Brown, The Bridge in the Desert, 88–89, and fn. 1), but also from other examples to be found in the cited publications and on the internet, such as the paper epistolary fragment from the cover of manuscript Sin. ar. 455. Cf. also Miklas (ed.), *Psalterium Demetrii Sinaitici*, 73.

[41] So we eagerly await the results of Michelle Brown's full description of the over fifty Latin manuscripts and palimpsests preserved

Textology

Even the oldest Slavic manuscript, the Kiev Folia (NBU, f. 301 no. 328), written in a unique mixture of West and South Old Church Slavonic, most likely during the second quarter of the 10th century,[42] contains translations from a Latin Sacramentary which currently can best be linked with the manuscript Paduanus Bibl. Capit. D. 47.[43] Discovered and very likely written in the Sinai, most scholars assign its two scribes to the former Moravian lands—in those days Hungary.[44] The origins of the Latin original can be sought in those areas which formerly belonged to the Patriarchate of Aquileia, but were partly missionarized by the Archdiocese of Salzburg and its subordinated dioceses.[45]

In due course we find further translations of Latin or mixed Latin-Italo-Greek texts in the Sinaitic Euchology from the second quarter of the 11th century[46] and in the Sinaitic Liturgiarium (cf. below under C), written by the same hand a few years later, and then again in secondary entries by the above-mentioned Demetrius in the Kiev Folia and in the Psalter named after him. In the Kiev Folia, on the initially empty first recto page, Demetrius added, after excerpts of the Old Church Slavonic Apostolus (Romans 13:11–14, Romans 14:1–4 as reading for tyrophagy), the prayer 'Super populum' on the Annunciation of the Virgin Mary (25. March), translated from the so-called Gregory Sacramentary.[47] Again in his Psalter, Demetrius also mainly filled the empty space with prayers, the last of which, entitled 'St. Gregory's Prayer' and dedicated to the forgiveness of sins before death (ff. 140r, lines 14–23, 140v, lines 1–9, 144r, lines 1–24), was only recently identified with the second part of a paraliturgical Latin prayer attributed to Gregory the Great.[48]

While the Liturgiarium was in all likelihood written in St. Catherine's by a Bulgarian scribe,[49] Demetrius' entries were definitely composed there, and date from the last quarter of the 11th century. His home seems to have been in Duklja, today's Montenegro, but before leaving for the Sinai he probably spent parts of his life in the area of Dubrovnik (possibly Ston) and on Istria.[50]

Content

The Liturgiarium contains several significant examples among its many texts translated from Latin, such as a short prayer devoted to abbot Aligernus of Montecassino (949–986)[51] and the mixed Liturgy of St. Apollinaris (formerly believed to be St. Peter's Liturgy)[52], predominantly based on a Latin version.[53] The latter may also have been connected with Montecassino, or its dependance at Valleluce, where Aligernus offered shelter

in St. Catherine's; for now see *inter alia* Brown, Imagining, Imaging, and Experiencing the East, 74–84 and Brown, The Bridge in the Desert, 88–98.

42 For the dating of the manuscripts, cf. Miklas and Hürner, A Numerical Approach.

43 See the facsimiles and texts in Nimčuk, *Kyjivs'ki hlaholyčni lystky*, and, on the manuscript, Schaeken, *Die Kiever Blätter*, Turilov, Kievskie listki, and Hürner, *Paläographie und Graphematik*.

44 Recently, attempts have also been made to assign them to the Serbian area, mainly on the basis of their accent marks; see only Savić, *Srpska književna reč*, 15–17, 266.

45 Cf., however, fn. 54.

46 In addition to a text connected with the Old High German tradition, the Euchology contains two translations from the Latin, one of them of Roman origin; see Parenti, The Krylov-Uspenskij Folia, 10.

47 Inc. *Zaštiti, gospodi, raby svoję* (cf. Nimčuk, *Kyjivs'ki hlaholyčni lystky*, 128, Schaeken, *Die Kiever Blätter*, 213, Savić, *Srpska književna reč*, 72–73) – *Protege, domine, famulos tuos*. For the Latin text of the Gregory Sacramentary, see *PL* 78.52. On account of its unusual order, it was characterized as having become a private prayer, see Pantelić, O Kijevskim i Sinajskim listićima, 27–28 and Savić, *Srpska književna reč*, 59.

48 Stankovska, K fototypickému vydání, 466–467; for the Latin text see Vepřek, *Modlidba sv. Řehoře*, 123–131; for the latest overview of Latin witnesses and its relationship to the Slavonic witnesses cf. Vepřžek, K voprosu.

49 Whether this is also true of the Sinaitic Euchologium, written by the same scribe, is not yet clear.

50 See Miklas and Hürner, Westliche Elemente, 14–15, 17 and Miklas *et al*., Preliminary Remarks, 53, 55.

51 Deriving from the Gelasianum and identified by Stefano Parenti (who is currently analyzing the micro-structure of the relevant part of the Liturgiarium) with CO 1061; inc. *Prěgresenię nemošti našeję. Molim sę gospodi – Delicta, domine, quaesumus* (f. 26v, lines 11–16).

52 Cf. Parenti, Glagoličeskij spisok and Parenti, Un testimonio glagolitico. The other liturgies contained in the Liturgiarium, the liturgy of St. Basil and parts of the liturgies of St. John Chrysostom and St. James, are translations from the Greek texts, cf. Parenti, The Krylov-Uspenskij Folia.

53 According to the current order (partly requiring correction) on ff. 15('13')–19.

to Nilus of Rossano (ca. 910–1004) and his flock in the 990s, although the whole compilation was probably composed elsewhere.[54] Moreover, by virtue of some secondary entries by Demetrius, this manuscript is also connected with his Psalter, while the *Missa s. archistrategae Michaelis* (f. 35v) associates the main part with the presumed palimpsest drawing of the saint in the Medical Folia.

The texts and names which Demetrius left behind on the first empty pages in his Psalter and in the first, Petersburg part of the Liturgiarium, can also be linked to his additions to the Kiev Folia as well as to the original content of the Liturgiarium.

First, there is the so-called ‘Prayer against the Wolf’, in which Dana Hürner and I see a hidden attack on Gregory VII’s anti-Slavonic language policy with regard to the liturgical tradition of Croatian Dalmatia.[55] Since the ‘Prayer against the Wolf’ is the first of an entire cycle in which Constantine-Cyril of Thessalonica (Teacher of the Slavs, inventor of the Glagolitic script, and key founder of the Slavonic liturgical language) and the Mother of God and Gregory the Great (both connected with Demetrius’ previous and current place of activity[56]) play the roles of the good heroes, we can conclude that in Demetrius’ despair, St. Michael the Archangel appears as the light-figure announcing the end of the threat by sheathing his sword (here: the knife)—just as he had appeared on top of Hadrian’s Mausoleum in Rome (hence Castel Sant’Angelo) in Gregory the Great’s vision of 590. And second, there is Demetrius’ Diptychon in the St. Petersburg fragment of the Liturgiarium,[57] which he must have added after he noticed that the person who had recorded Apollinaris’ Liturgy in its main part (f. 17v) had omitted the relevant passage in his copy or (rather) translation.[58] The Diptychon also includes the Western names Mastal, Petrunia, and Romald.[59]

Mastal can most probably be identified with Mastulus, Gregory the Great’s valued supporter in the Three Chapter controversy, who was bishop of Sabiona in Southern Tyrol, and also in charge of Istria. Petrunia (Petronia) has been identifed by Maria Pantelić with Petronilla of Rome,[60] whose relics had been transferred to Dubrovnik around 920. And Romald is clearly Romuald of Ravenna, the ardent follower of Apollinaris and founder of the Camaldolese, who exerted great influence on Istria and in Dalmatia.[61] He spent about two years on Istria (approx. 1001–1002), during which he also founded or revitalized several monasteries, of which the abbey of St. Michael’s over the Limfjord (Sv. Mihovil nad Limom, San Michele di Leme) and St. Petronilla in Dvigrad (Duocastelli) deserve special mention in our context.[62] Under the influence of reading the works

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[54] Stefano Parenti (personal communication) thinks in terms of an Italo-Greek centre in southern Italy. Comparable examples suggestive of a similar background can be found elsewhere. For example, an interesting parallel to the core Latin section is offered by a Trier Missal from the beginning of the 17th century, today part of Cod. Sém. de Luxembourg 4, ff. 15r sqq., cf. Falmagne, *Die Echternacher Handschriften*, 528. M. Pantelić had already traced the origin of the prayer ‘Kiss of the Cross’ (*Oratio in tertia genuflexione*) in the Petersburg part of the Liturgiarium (BRAN 24.4.8, f. 1v, lines 22–26) to sources in the Trier-Mainz-Cologne area, see Parenti, The Krylov-Uspenskij Folia, 8–10 and Miklas *et al*., Preliminary Remarks, 62. Also, the above-mentioned Padua manuscript Bibl. Capit. D. 47, which contains the most relevant parallels to the Kiev Folia (and connects them with the Liturgiarium through the Mass of St. Clement, Sin. slav. NF 5, f. 36r), derives from the lower Rhine area between Aachen and Liège. And in the early Church Slavonic heortological examples, we encounter, besides Roman and Italo-Greek names, elements from the Lower Rhine area (especially Trier), St. Gall, and, in rare cases (such as the one of St. Cuthbert) even of Insular origin; cf. Miklas, Zur Einordnung des Westgutes, 119–122. All these connections will have to be reviewed again, taking into account the ‘oriental connection’.

[55] For the following see Hürner, *Paläographie und Graphematik*, 382–391, and Miklas *et al*., Preliminary Remarks, 56–58.

[56] While the monastery on the Sinai was dedicated to the Mother of God and at that time still exclusively known as ‘Panagia’, pope Gregory I.—because of his great attention to and care for the Sinai and Jerusalem—remained highly esteemed by the Sinaitic monks until the 14th century, see Miklas *et al*., Preliminary Remarks, 63, and more generally, Brown, Imagining, Imaging, and Experiencing the East, 59, 76, 77, 78, 81–82, Brown, The Bridge in the Desert, 74sqq., 89, 90, 93.

[57] Here RNB glag. 2; cf. the whole diptychon in Miklas *et al*., Preliminary Remarks, 44.

[58] Even more indicative is the fact that in the enumeration of holy names on f. 16r, Roman saints are eliminated, while on f. 18v, after Clemens Romanus, the teachers of the Slavs appear (‘...*Clemente,* Cyrillo et Methodio *et omnibus sanctis tuis*’).

[59] On the following see Pantelić, O Kijevskim i Sinajskim listićima, 33–41, Miklas and Hürner, Westliche Elemente, 316, 317, and Miklas *et al*., Preliminary Remarks, 43–48, 52, 55, 60–62.

[60] Pantelić, O Kijevskim i Sinajskim listićima, 34–35, and Miklas *et al*., Preliminary Remarks, 44 fn. 87.

[61] Miklas *et al*., Preliminary Remarks, 45–47.

[62] For Istrian monasteries connected with Romuald and his followers see Hürner, *Paläographie und Graphematik*, 363 and the articles of S. J. Škunca (kamaldolci), R. Matijašić and S. Mustač (Kloštar), I. Jurković (Acika) and Đ. Križman-Zorić (Anson), in Bertoša and Matijašić, *Istarska enciklopedija*.

of John Cassian and others, he encouraged his pupils to go to Egypt, Syria, Mount Sinai, and Mount Athos.[63]

While the topics in this short sketch will surely continue to occupy us in the future, a brief conclusion is in order: since it was very likely Demetrius who inserted the Medical Folia into his Psalter, the direct and circumstantial evidence presented here speaks in favour of Istria as place of origin of their Latin palimpsest.

ABBREVIATIONS

BRAN = St. Petersburg, Library of the Russian Academy of Sciences
GIM = Moscow, State Historical Museum
NBU = Kiev (Kyiv), National Library of Ukraine
RGB = Moscow, State Library of the Russian Federation
RNB = St. Petersburg, National Library of Russia

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[63] Miklas *et al*., Preliminary Remarks, 47 fn. 91, 63. More generally on the subject see Brown, Imagining, Imaging, and Experiencing the East, 52, Brown, The Bridge in the Desert, 81, and the contributions of Michelle Brown and Father Justin in this volume.

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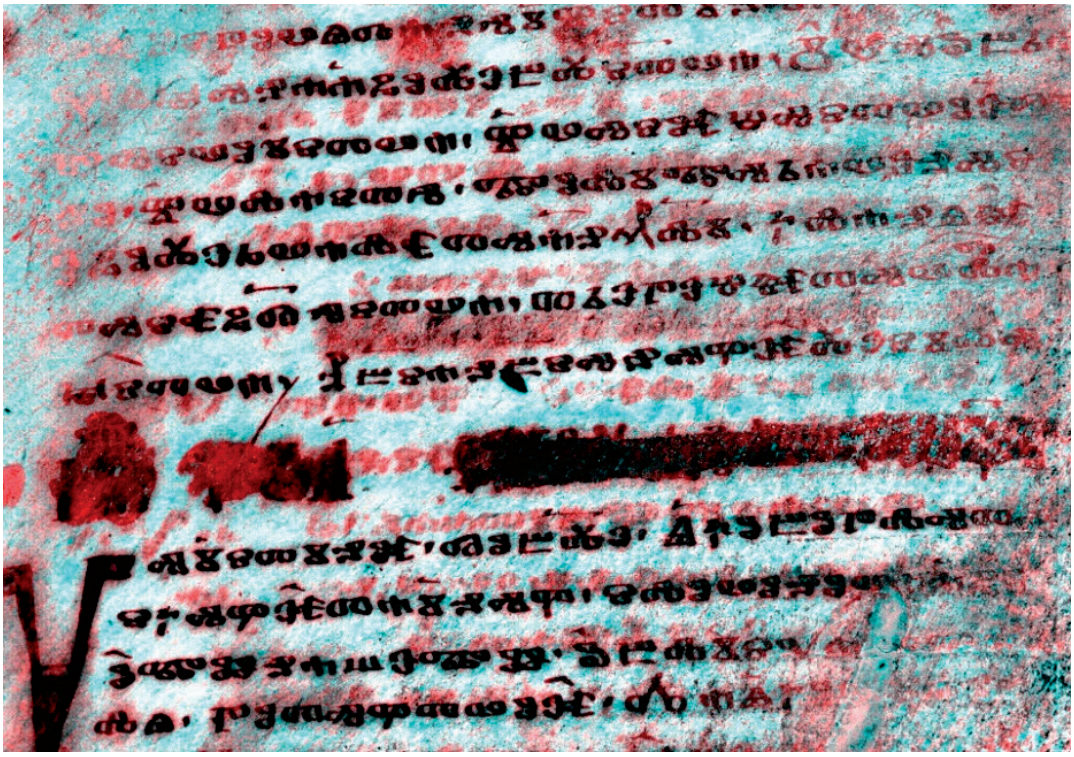

Fig. 1: Cod. Sin. slav. NF 5, f. 39r (excerpt) – Glagolitic underlayer
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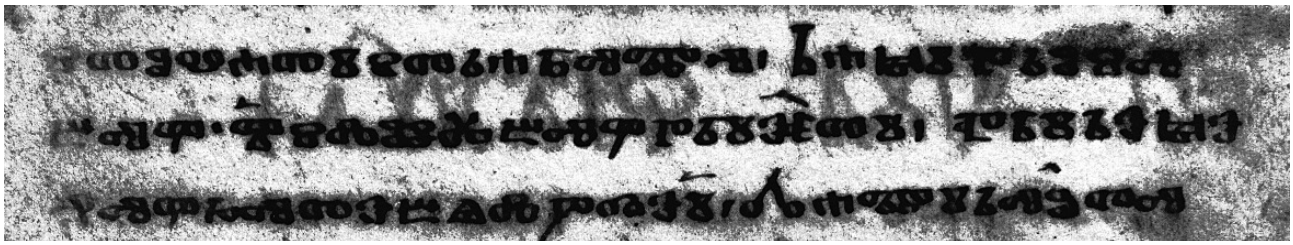

Fig. 2: Cod. Sin. slav. NF 5, f. 24v (excerpt) – Glagolitic palimpsest-headline
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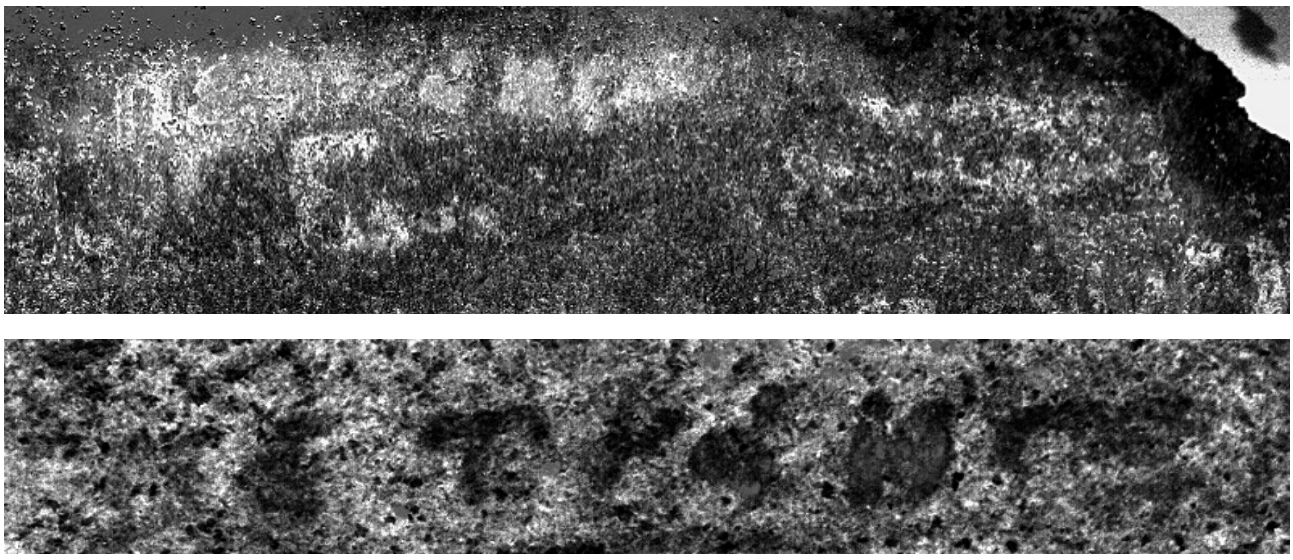

Fig. 3: Cod. Sin. slav. NF 5, f. 32v (excerpts) – Cyrillic palimpsest-passages (© St. Catherine’s Monastery, Sinai, Egypt)

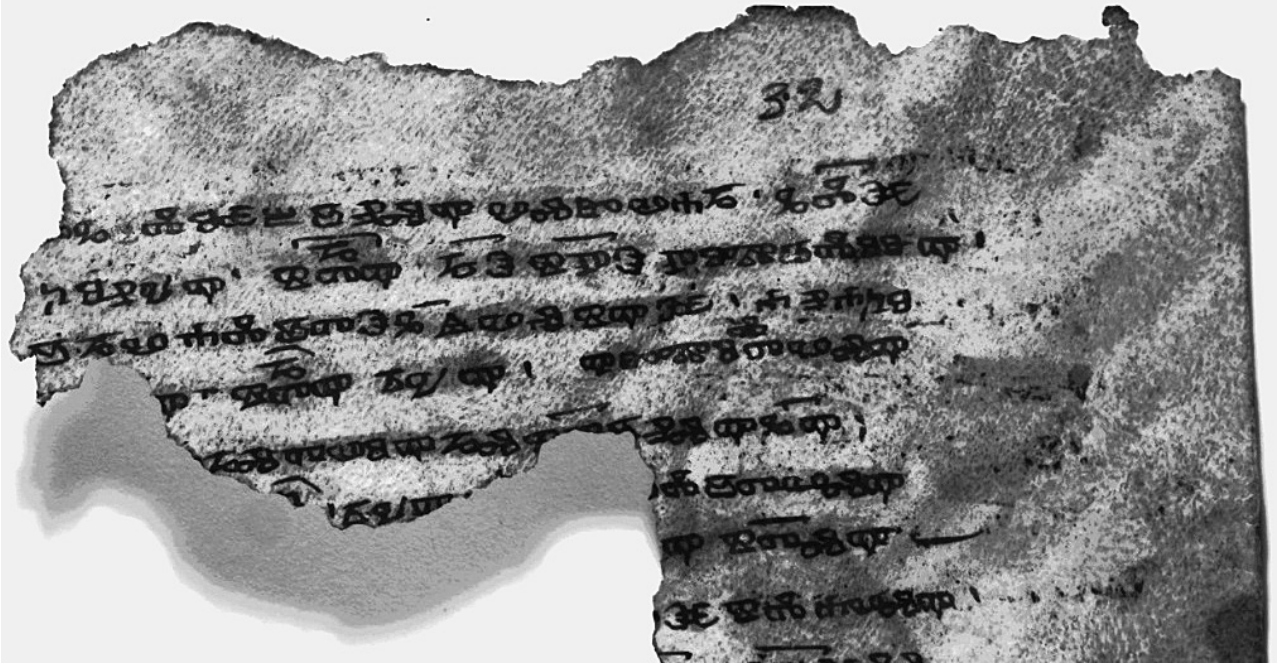

Fig. 4: Cod. Sin. slav. NF 2, f. 32r (excerpt) – traces of Glagolitic underlayer
(© St. Catherine's Monastery, Sinai, Egypt, © M. Lettner, F. Kleber, H. Miklas as part of the FWF project P19608)

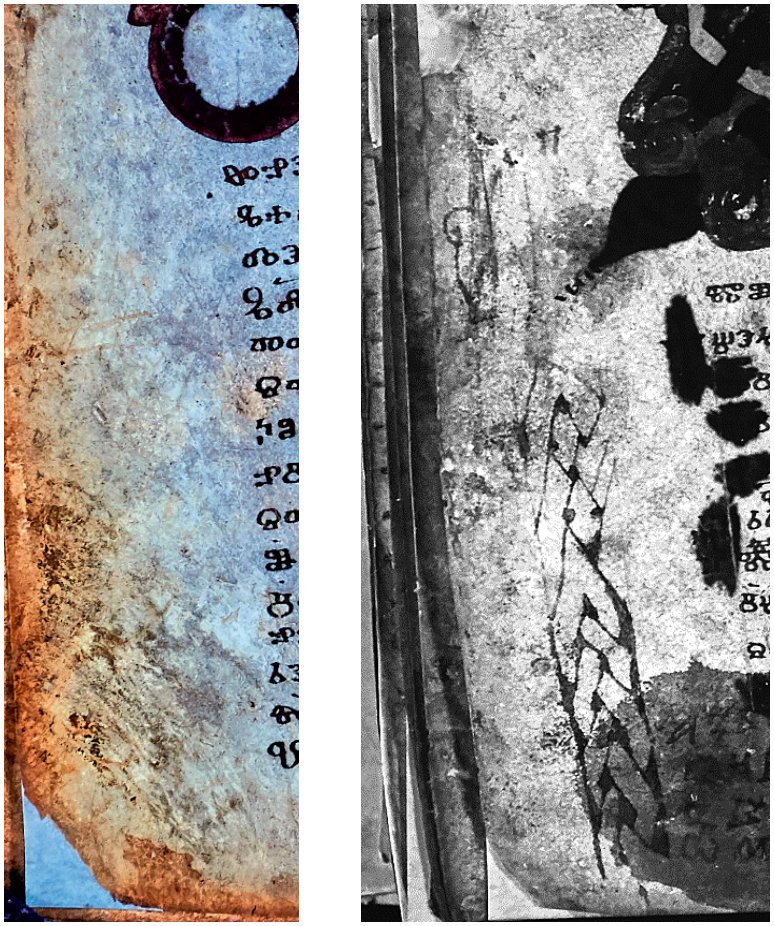

Fig. 5: Cod. Vat. slav. 3 – remainders of braided strips or initials on ff. 156v (left) and 157v (right)
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Fig. 6: Cod. Vat. slav. 3 – probable palimpsest traces on ff. 50v (above), 51r (bottom left) and 158r (bottom right)
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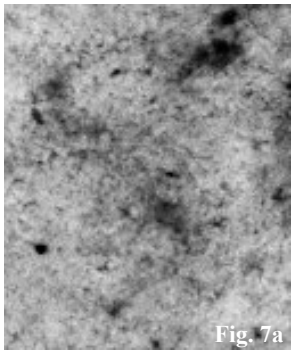

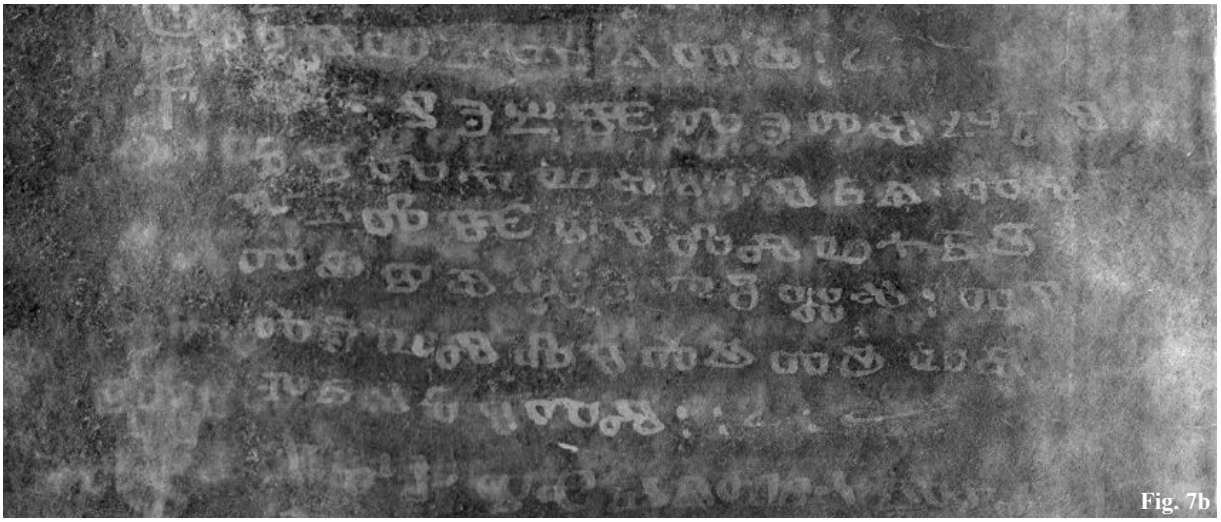

Fig. 7a–c: Glagolitic Medical Folia (inserted in Cod. Sin. slav. NF 3), f. 141av (excerpts) – traces of Latin (7a), Glagolitic (7b) and Cyrillic (Greek?) (7c) underlayers
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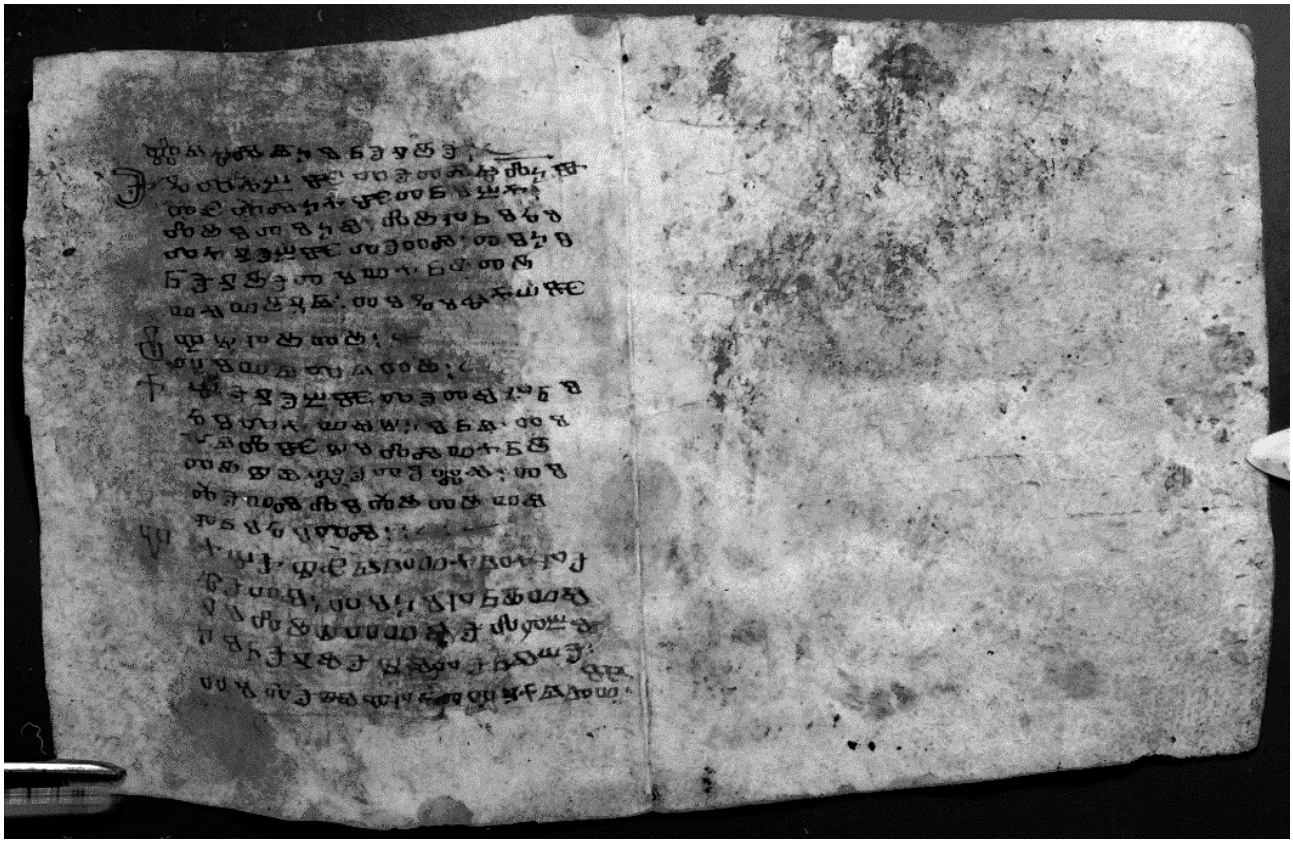

Fig. 8: Glagolitic Medical Folia (inserted in Cod. Sin. slav. NF 3), ff. 141av–141fr (*inter alia* with traces of palimpsest miniatures) (© St. Catherine's Monastery, Sinai, Egypt, © M. Lettner, F. Kleber, H. Miklas as part of the FWF project P19608)

Fig. 9: Glagolitic Medical Folia (inserted in Cod. Sin. slav. NF 3), f. 141fr – traces of palimpsest miniature (© St. Catherine's Monastery, Sinai, Egypt)

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Ronny Vollandt

Palimpsests from the Cairo Genizah and the Qubbat al-Khazna in Damascus

GWILLIAM'S CHRISTIAN PALESTINIAN ARAMAIC PALIMPSESTS

In 1893, George Henry Gwilliam published five fragments in the possession of the Bodleian Library containing parts of the Old and the New Testaments in Christian Palestinian Aramaic (CPA), the language used by the Christian Melkite community in Palestine from around the 5th to the 13th century.[1] It was an important addition to the known corpus of texts in Christian Palestinian Aramaic at this time, the majority of which consisted of translations from Greek and were, above all, Biblical Scriptures. Only three years later, in 1896, Gwilliam—this time joined by Francis Crawford Burkitt and John Frederick Stenning—presented an edition of five additional fragments, two of them again from the Bodleian Library, containing further hitherto unknown texts in Christian Palestinian Aramaic.[2] All of the fragments had something in common: they had only survived as a result of reuse and they were palimpsests.

The five fragments of the first publication and the two Bodleian fragments in the second shared another characteristic. They were written over with parts of the Mishnah and the Midrash Sifra, in Hebrew, and their provenance was just as strange as the assortment of scholars who had presented them to the public.[3]

The somewhat peculiar party of professional palimpsest scholars who had published the second set of fragments were brought together by their scholarly interest in Christian Palestinian Aramaic and Aramaic more generally. Gwilliam (1846–1913), educated at King's College London and Jesus College, Oxford, was a fellow of Hertford College, Oxford, and is primarily known for having completed and published an edition of the New Testament Peshitta started by Philip E. Pusey.[4] Stenning (1868–1959) was similarly an Oxford man and had just completed his undergraduate studies in Oriental languages with first-class honours in 1891, specializing in Hebrew and Aramaic.[5] The two scholars had been planning to prepare the edition of fragments jointly when they became aware of newly discovered palimpsests that yielded further texts in Christian Palestinian Aramaic.[6] This led to their eventual collaboration with an additional author; but the tale of how it came about is a complex one.

The report of new palimpsested fragments had arrived from St. Catherine's Monastery in Sinai. The Cantabrian scholar James Rendel Harris (1852–1941) had discovered parts of the Pauline Epistles in Christian Palestinian Aramaic there back in 1889, and it had proven to be an unrivaled location for finding ancient Biblical texts.[7] The sisters Agnes Smith Lewis (1843–1926) and Margaret Dunlop Gibson (1843–1920), encouraged and taught basic photography skills by Harris, had embarked on a number of trips to Sinai in his wake. Harris had not only introduced them to the monks, but also instructed them on how to gain access to manuscripts.[8]

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[1] Gwilliam, *Palestinian Version*. They are today preserved as Oxford, Bodleian Library, MSS Syr. c. 15–18 (formerly Syr. c. 4). Andreas Masius (1514–1573), Giuseppe Simone Assemani (1687–1768) in his *Bibliotheca Orientalis*, Joseph White (1745–1814), Adler (1756–1834), and others had preceded him in wresting this language from the oblivion of time.

[2] Gwilliam *et al.*, *Biblical and Patristic Relics*.

[3] For the two palimpsests of the second collection that were overwritten with Hebrew, see Gwilliam *et al.*, *Biblical and Patristic Relics*, 7–28. Today they are kept as Oxford, Bodleian Library, MSS Syr. d. 32–33 (P).

[4] Pusey and Gwilliam, *Tetraeuangelium sanctum*.

[5] Stenning later became a fellow of Wadham College, a lecturer in the Old Testament, and finally reader in Aramaic at the University of Oxford; see *Who's Who*, Stenning, John Frederick.

[6] Gwilliam *et al.*, *Biblical and Patristic Relics*, 5.

[7] See Harris, *Biblical Fragments from Mount Sinai*. On his visit to Sinai, see Falcetta, *Discoveries of a Bible Scholar*, 88–93; Falcetta, James Rendel Harris.

[8] In the preface of her *Translation of the Four Gospels*, Lewis goes into great detail on how Harris prepared them for their trip. In particular, however, see Soskice, *Sisters of Sinai*; Jefferson, Sisters of Semitics.

During their first trip in 1892, the story of which is widely known, the sisters had been able to examine more closely a chest of Syriac manuscripts that Harris had not had the chance to observe. Their interest quickly centred on a palimpsest codex. The upper text exhibited a martyrology of female saints, while the *scriptio inferior* disclosed the Old Syriac Gospels. The sisters returned to Cambridge with about 400 photographs of the latter, which was soon to be celebrated as its most ancient translation of the Gospels. Its transcription was entrusted to Harris, and also to Robert Bensly—a lecturer in Hebrew and Syriac at Gonville and Caius College, Cambridge, and Lord Almoner's Professor of Arabic since 1887—and Francis C. Burkitt, his closest disciple and the up-and-coming Biblical scholar at Cambridge. The latter had already been preparing an edition of the Cureton codex, a manuscript that had been deciphered by William Cureton after its discovery in the Monastery of St. Mary Deipara in the Nitrian Desert in 1838 by Henry Tattam; this manuscript contained the same text as the one found by Lewis and Gibson.

A year later, the sisters returned to Sinai, this time accompanied not only by Harris, Bensly, and Burkitt, but also by the wives of the latter two, Agnes and Persis. Once at the monastery, the scholars took turns comparing their transcriptions with the manuscript. However, a disagreement quickly arose as to who should be given priority for the scholarly discovery of the Old Syriac Gospels, and this split the party into two: on the one side, the Benslys and Burkitts, who believed that they should be credited with first grasping the academic value of the codex; and on the other, the sisters and Harris, who first became aware of the manuscript.[9] Meanwhile, Lewis and Gibson had commenced work on their catalogues of Syriac and Arabic manuscripts, for which they had obtained permission from Archbishop Porphyrios, and Harris assisted them and soon became interested in two lectionaries in Christian Palestinian Aramaic, one of which had been presented to Lewis by the librarian Father Galaktéon in 1892.[10]

News of the various discoveries in Sinai found its way to Oxford, and Stenning became involved, with the promise of further manuscripts in Christian Palestinian Aramaic leading him to Sinai in 1894.[11] He arrived with a variety of commissions: Harris had asked him to correct the portions of the Old Syriac Gospels that he had been transcribing;[12] Gibson commissioned him to transcribe a passage that she had lost;[13] and Lewis wanted additions to her catalogue.[14] While there, Stenning also succeeded in finding a new portion of the Bible in Christian Palestinian Aramaic: he found the hitherto unknown book of Kings in Christian Palestinian Aramaic as the undertext of an Arabic prophetologion (Sin. ar. 588).[15]

It is against the background of this story of the discoveries at St. Catherine's Monastery that the joint publication of an edition of the five additional Christian Palestinian Aramaic fragments in 1896 by the somewhat unexpected company of Gwilliam, Stenning, and Burkitt has to be understood. Gwilliam and Stenning had planned to present only the two fragments that had recently come into the possession of the Bodleian Library, but they halted publication to include further finds from Sinai. Stenning was able to add his further find to the publication.[16] Equally, it seems that with the wish to disassociate themselves completely from their three former colleagues (Harris, Gibson, and Lewis) following the rift in Sinai, Burkitt and Agnes Bensly—a widow by this time, and not acknowledged as an author—also contributed their finds to the publication.[17]

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[9] See Soskice, *Sisters of Sinai*, 166–187; Falcetta, *Discoveries of a Bible Scholar*, 120–125.

[10] Harris created an appendix of fragments, and furnished correction and additions to his *Biblical Fragments of Sinai*; see Lewis, *Catalogue of the Syriac MSS.*, ix and 93–123. On the Christian Palestinian Aramaic lectionaries, see Lewis, *Palestinian Syriac Lectionary*, v; Lewis, *In the Shadow of Sinai*, viii.

[11] He mentions this trip, which he undertook with Arthur Cowley, in Gwilliam *et al.*, *Biblical and Patristic Relics*, 5. Cowley (1861–1931) had worked with Alfred Neubauer, sub-librarian at the Bodleian Library, from 1890 onwards, before he himself was appointed to that position.

[12] See Falcetta, *Discoveries of a Bible Scholar*, 127.

[13] Gibson, *Epistles of St Paul*, 8.

[14] See Lewis, *Catalogue of the Syriac MSS.*, x and 125–131.

[15] This find does not seem accidental. Lewis appeared to have instructed him carefully on where to find such texts. See Falcetta, *Discoveries of a Bible Scholar*, 525 fn. 123.

[16] Stenning's manuscript fragment is found in Gwilliam *et al.*, *Biblical and Patristic Relics*, 29–36.

[17] Burkitt's contribution is found on pp. 37–44 of Gwilliam *et al.*, *Biblical and Patristic Relics*, and Agnes Bensly's, with a translation and notes by Gwilliam and Burkitt, on pp. 45–101. As an aside, it can be mentioned that it was only with a good deal of diplomacy on the part of William Robertson Smith (Adams Professor of Arabic at Cambridge and a good friend of Gibson and Lewis) that Burkitt agreed to participate with Lewis and Harris in the edition and final publication of the Old Syriac Gospels; see Bensly *et al*., *Four Gospels in Syriac*.

Gwilliam's first edition in 1893 had provided scholarship with portions of Numbers (4:46, 47; 4:49–5:2; 5:3, 4; and 5:6–8), Colossians (4:12–18), 1 Thessalonians (1:1–3 and 4:3–15), 2 Timothy (1:10–2:7), and Titus (1:11–2:8) in Christian Palestinian Aramaic. The joint edition three years later additionally yielded Exodus (28:1–12), Wisdom (9:8–10:2), Kings (2:10–15 and 9:4–5), and Job (22:3–12), and added some homilies to the corpus. In the race for new fragments in Christian Palestinian Aramaic, the sheer number of texts had tipped the balance in favour of Gwilliam and his collaborators. The odds were even more on their side, as Gwilliam appeared to know about a secret source for manuscripts arriving at the Bodleian Library that neither Harris nor the sisters Lewis and Gibson were acquainted with. Or at least, not at this point of the story …

So where did the seven fragments from the Bodleian Library with Hebrew upper texts that Gwilliam and his colleagues presented to the scholarly public emerge from? Unlike most of the other Christian Palestinian Aramaic texts that came to light at the end of the 19th century, they were not from St. Catherine's.

A hint came from the fact that all of them were reused for Hebrew texts, and notably texts from the rabbinic period. But in the 1893 publication, Gwilliam was hesitant to disclose the source, and reported only that the fragment arrived in Oxford in 1891 'from Egypt' via the late Reverend Greville John Chester (1830–1892).[18] Chester was an Oxford alumnus and spent the latter half of his life mostly as an antiquities dealer supplying the British Museum and other major institutions. Among his customers was also the Bodleian Library and, as documented in his letters to the Bodleian Librarian Edward Williams Byron Nicholson, in 1889 Chester started to supply Hebrew manuscripts through a local dealer; some of these were evidently the ones edited by Gwilliam in 1893.[19] However, Chester insisted on secrecy in this matter. In March 1892, though, only a few months before he died, he admitted that he had lost access to any further documents of this type.[20]

In the following publication with Stenning and Burkitt, Gwilliam announced that 'shortly after the publication [of the 1893 edition] two more fragments were procured by Professor Sayce', and added that 'all the seven leaves had been discovered with other writings, in an underground chamber beneath a synagogue in Cairo'. The Assyriologist and linguist Archibald Henry Sayce (1846–1933) had visited the Ben Ezra Synagogue in 1883 and, after Chester ceased being able to supply documents, Sayce was commissioned by Adolf Neubauer (1831–1907), reader in Rabbinics and a Bodleian sub-librarian, to locate the source of Chester's fragments.[21] By 1895, Sayce informed Neubauer that 'my Cairo friend [his assistant, Count Riamo d'Hulst] has succeeded in discovering & entering the old subterranean place from which the Hebrew MSS have all come'.[22]

This 'subterranean place' belonged to what became known from the 1890s as the Cairo Genizah: an assemblage of roughly 330,000 folios of manuscript books and documents that were believed to have been preserved in the storage room of the Ben Ezra Synagogue in Fustat—that is, Old Cairo.[23] Originally built in the 10th century, the synagogue was destroyed in 1012 during persecutions following the Fatimid Caliph al-Ḥākim's (996–1021) policies of repression against Jews and Christians, and was rebuilt some thirty years later. It functioned as a receptacle for worn-out books from its rebuilding in around 1040 onward.

What emerges from the account above is that the various palimpsests with Hebrew upper texts published by Gwilliam, Stenning, and Burkitt in 1893 and 1896 had emerged from the Cairo Genizah, and were among the earliest fragments brought to Europe from that source. Gwilliam's edition of the five palimpsests in 1893 in fact is believed to be one of the earliest publications based on texts from there. At the time, however, their importance was primarily because the *scriptio inferior* conserved texts in Christian Palestinian Aramaic, ancient Biblical texts that were hardly known, despite being crucial and early witnesses—such texts were the prime commodity of that time. The *scriptio superior* in Hebrew did not cause much excitement; indeed, Neubauer himself stated that 'the Hebrew of these fragments is, relatively, of little value'.[24] Furthermore, this account shows how intrinsically the process of discovering manuscripts at Cairo and at Sinai were linked, even before Lewis and Gibson acquired further fragments in the spring of 1896 on their fourth trip to the Near East, on

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[18] Gwilliam, *Palestinian Version*, v.

[19] Jefferson, "What cannot often be obtainable".

[20] See Jefferson, "What cannot often be obtainable", 13; Jefferson, Deconstructing "the Cairo Genizah", 443.

[21] The reader is again referred to Jefferson, Deconstructing "the Cairo Genizah".

[22] See Jefferson, Cairo Genizah unearthed; Jefferson, Genizah secret.

[23] There is now increasing evidence that there were materials mixed into the finds from other places in Cairo. See Jefferson, Deconstructing "the Cairo Genizah".

[24] Gwilliam, *Palestinian Version*, v.

which they had embarked despite not being in the greatest of health. Those latter fragments would eventually alert Solomon Schechter (1847–1915) to the existence of the Cairo Genizah.

OTHER EARLY DISCOVERIES OF PALIMPSESTS IN THE CAIRO GENIZAH

The interest and scholarly ambition of the sisters, Lewis and Gibson, in the field of Christian Palestinian Aramaic did not cease. They had continued working on the two lectionaries at Sinai, and while they were on their way to St. Catherine's Monastery in the spring of 1895—their third trip there—Lewis acquired another copy in Cairo.[25] While they had a great deal of material to work on already, they decided on a fourth trip the following year, this time to Cairo. They had at first decided not to travel that year, but the 'news we received from Cairo seemed to indicate that there might be a chance of our finding something there', as Lewis later recounted.[26] It is not unlikely that the recent activities in Oxford, and above all the 1896 publication by Gwilliam, Stenning, and Burkitt, had drawn their attention to Cairo, particularly because they had maintained a good relationship with Stenning at least.

As is well known, the sisters returned with a sack of fragments from the Cairo Genizah that included a copy of the book of Ben Sira in the original Hebrew. This fragment caused a sensation, and led to a campaign from Cambridge University led by Schechter, which retrieved about 200,000 fragments from Cairo in 1897, about two-thirds of all the Cairo Genizah fragments in existence.[27] As before, ancient Biblical texts were the main focus of attention, prominent among them palimpsests. Lewis and Gibson soon found further fragments that suited the interests of the time—in 1900 they published thirty-four new Christian Palestinian Aramaic palimpsests, four that they had brought from Cairo themselves, and thirty that had arrived in Cambridge with the large bulk of fragments three years earlier.[28] Like the palimpsests published in Oxford by Gwilliam and his collaborators, the Hebrew upper texts on these palimpsests consisted of passages from rabbinic literature, such as the Palestinian Talmud and the Midrash Bereshit Rabbah, and Hebrew liturgical poetry.

The Cairo Genizah not only stored Christian Palestinian Aramaic palimpsests, but also ones with Greek undertexts. By 1897, Burkitt and Charles Taylor, a Hebraist and at the time Master of St. John's College in Cambridge, had, for example, already discovered and edited fragments of the book of Kings according to the translation of Aquila of Sinope.[29] Aquila's 2nd-century retranslation of the Hebrew Bible into Greek is commonly described as a mirror translation, as it adheres much more closely to the Hebrew than did the Septuagint, using a peculiar calque language.[30] But the translation itself had been deemed lost, surviving only in a few quotations by Church Fathers and in the Talmud and the margins of Hexaplaric manuscripts. However, in 1897 it resurfaced—at least for 1 Kings 20:1–17 and 2 Kings 23:11–27—as the undertext of a palimpsest from the Cairo Genizah. Even more sensational was Taylor's discovery of a leaf of Origin's Hexapla, one of the only two direct manuscript witnesses in existence.[31] It contained Psalm 22:15–18 and 22:20–28, before being written over with the Hebrew liturgical poetry of Yannai, who was active in the 7th century in Palestine.

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[25] Lewis, *Palestinian Syriac Lectionary*. For Qurʾānic palimpsests from Damascus and Cairo (and elsewhere), see also the contribution by Alba Fedeli in this volume.

[26] Lewis, *In the Shadow of Sinai*, 143.

[27] See, for example, Reif, *Jewish Archive*; Hoffman and Cole, *Sacred Trash*. The sisters' involvement is described, in Lewis's own words, in her book *In the Shadow of Sinai*, 143–189.

[28] Lewis and Gibson, *Palestinian Syriac Texts*. It should be noted that the sisters kept on publishing Christian Palestinian Aramaic texts from Sinai as well; see Lewis, *Codex Climaci Rescriptus*.

[29] Burkitt and Taylor, *Book of Kings*; see also Burkitt, Aquila. Today these fragments are held as Cambridge University Library, MSS T-S 12.184 and T-S 20.50. For a more recent assessment of these documents, see Gallagher, Aquila manuscripts.

[30] The reader is referred to Salvesen, *Origen's Hexapla*; Grafton and Williams, *Transformation of the Book*. See also Bartélemy, *Les devanciers d'Aquila*; Grabbe, Aquila's translation; Paul, La Bible grecque d'Aquila; Salvesen, Midrash in Greek?; Salvesen, Aquila and Symmachus.

[31] Taylor, *Cairo Genizah Palimpsests*. The fragment of the Hexapla is today preserved as Cambridge University Library, MS T-S 12.182. See also Jenkins, First column. For a further Biblical palimpsest with a Greek undertext, published in 1903, see Taylor, New Septuagint fragment; Hart, New Septuagint fragment.

PALIMPSEST FRAGMENTS FROM THE UMAYYAD MOSQUE IN DAMASCUS

Exhilarated by their discoveries at Sinai and in Cairo, scholars in Oxford and Cambridge prepared their texts for publication. Not only had they retrieved important witnesses to the Old Syriac Gospels and long-lost Greek versions of the Scriptures, despite these having been erased so that the pages could be redeployed by scribes as a new book, but also large parts of the Bible in Christian Palestinian Aramaic had been rediscovered.

Then around the turn of the century, this time in Berlin, a new source of palimpsests became known. As the title of Friedrich Schulthess's study of twenty-one additional Christian Palestinian Aramaic fragments indicates, this time the source was the Umayyad Mosque in Damascus.[32] In contrast to the previous palimpsests, these mostly exhibited Islamic texts in Arabic, chiefly the Qurʾān, as *scriptio superior*. They were found at the end of the 19th century in the so-called Qubbat al-Khazna (the Treasury Dome), an octagonal chamber in the mosque's courtyard that stands on eight Roman columns and is decorated with mosaics. The chamber primarily contained old Qurʾāns and literary texts, but there were also hajj certificates and documents pertaining to everyday life, such as marriage and divorce contracts and deeds.

The existence in Damascus of this *genizah*, an established place for storing any sacred books and documents that were too fragile to remain in circulation or which had fallen out of use, had always been known to the local population, who venerated it and embellished it with many legends. But notice of the manuscript treasures in the Qubbat al-Khazna reached Hermann von Soden (1852–1914), who had been carefully following the finds his colleagues in Oxford and Cambridge had made.[33] He had been working on a new edition of the Greek New Testament in Berlin and, endowed by a patron with the right financial means, he was infected with a similar frenzy to gather new sources for textual criticism.

On von Soden's initiative, Wilhelm II, the German emperor and Prussian king, urged the Sublime Porte in Constantinople to allow a scholar to access the material in the Qubbat al-Khazna and sift through it, and permission was granted by Abdul Hamid II in the form of an *irāda*. Bruno Violet was entrusted with the task and arrived in Damascus on May 30, 1900. The mosque's authorities stipulated that he could only consult non-Muslim fragments, and put them aside for further study. About a year later, another *irāda* of Abdul Hamid II gave permission for the collection of non-Muslim fragments amassed by Violet to be sent to Berlin on loan. The collection arrived in Berlin on June 17, 1902, and was held first in the Royal Museums, then in 1904 it was moved to the State Library. It consisted mainly of Jewish, Christian, and Samaritan texts, in a variety of scripts and languages: Greek, Hebrew, Samaritan, Latin, Coptic, Syriac, Christian Palestinian Aramaic, and even Armenian. A significant number of these fragments were palimpsests or had been reused as the bindings of books. The analysis and publication of these fragments in Berlin continued until, unexpectedly, the Ottomans demanded their return in December 1908, after six years.[34]

The whereabouts of the fragments today are unknown.[35] However, two sets of photographs are accessible: a batch of images that Violet took before he departed for Berlin on July 2, 1901;[36] and a set of photographs taken on the basis of a prioritized list prepared by von Soden, which contains fifty-four fragments and an almost complete Syriac codex, all that could be photographed before the collection was sent back in its entirety.[37]

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[32] Schulthess, *Christlich-palästinische Fragmente*.

[33] For more details, see Vollandt, Beyond Arabic and, most recently, D'Ottone Rambach *et al.* (eds.), *The Damascus Fragments*. The article that sparked much of the recent interest in the Qubbat al-Khazna is D'Ottone and Radiciotti, I frammenti della Qubbat al-Khazna; see also D'Ottone, Manuscripts as mirrors; Bandt and Rattmann, Die Damaskusreise Bruno Violets.

[34] A bilingual Greek-Arabic fragment of Psalm 78:20–31, 51–61 (LXX 77) was the first published text from the Qubbat al-Khazna; see Violet, Ein zweisprachiges Psalmfragment. Three fragments in Old French were published by Tobler, Bruchstücke altfranzösischer Dichtung. A writ of protection by Balduin IV is seen in von Soden, Bericht. As mentioned above, twenty-one fragments in Christian Palestinian Aramaic were published in Schulthess, *Christlich-palästinische Fragmente*. Biblical fragments in Greek received the most attention, and were included in von Soden, *Die Schriften des Neuen Testaments*, x–xiii, 74, 118, 124–126.

[35] Although there are strong indications that they returned to Damascus, see D'Ottone Rambach *et al.* (eds.), *The Damascus Fragments*.

[36] Violet's photographs are found today in the Berlin-Brandenburg Academy of Sciences and Humanities, with the shelf mark BBAW/GCS, Akz.-Nr. 481. They can be accessed at https://bibelexegese.bbaw.de/handschriften/damaszener-handschriften/ (accessed 01.07.2023).

[37] These photographs are kept today in two folders in the Berlin State Library, Or. sim. 5 and Or. sim. 6. The former contains a Syriac translation of Theodore of Mopsuestia's commentary on Qoheleth, which has been published in Strothmann, *Das syrische Fragment*; the digitized photographs can be accessed at http://resolver.staatsbibliothek-berlin.de/SBB0000AD1D00000000 (accessed

PREVIOUS RESEARCH ON PALIMPSESTS FROM THE CAIRO GENIZAH AND THE QUBBAT AL-KHAZNA

In a letter to Theodor Nöldeke, dated August 26, 1900, Violet noted with excitement the discovery of his first palimpsest.[38] The fragment showed the Qurʾān written as *scriptio superior* on erased parts of the Pauline Epistles in Christian Palestinian Aramaic (which can be identified with no. 33 in the list in the appendix). Quickly he found additional palimpsests with Biblical texts in Christian Palestinian Aramaic and decided to smuggle them out of the country on his return to Germany. His close friend Friedrich Schulthess published them in 1905.[39] For most of the 20th century research on the palimpsests from the Qubbat al-Khazna was impeded by the fact that after 1908 only the photographs remained accessible.

New fragments from Cairo emerged steadily.[40] Moshe Goshen-Gottstein was the first to gather and re-edit all known fragments of the Scriptures in Christian Palestinian Aramaic, including those from the locations discussed here and a small number from previously unknown sources.[41] His students Michael Sokoloff and Josef Yahalom presented a first comprehensive study on Christian palimpsests from the Cairo Genizah in 1987. This publication, which is based on earlier identifications, remains to date the most comprehensive investigation into the topic, comprising a masterful reassembling of over a hundred palimpsests in a variety of languages.[42] Subsequently Christa Müller-Kessler, in collaboration with Sokoloff, inaugurated the series *A Corpus of Christian Palestinian Aramaic*, which not only re-edited the fragments in Christian Palestinian Aramaic again, but also added new finds from the Cairo Genizah and other places.[43]

As for the palimpsests with Greek *scriptio inferior*, Natalie Tchernetska furnished a series of publications in which she identified further fragments and provided a paleographic study.[44] Together with Judith Olszowy-Schlanger and Nicolas de Lange, she also edited and described a palimpsest fragment that preserved a bilingual Hebrew-Greek glossary of Jewish provenance, from the 9th century.[45] Recently, Olszowy-Schlanger discovered an early Hebrew palimpsest scroll of *hafṭarot* under an anonymous book of legal formularies (*sefer šeṭarot*) written in Lucena, Spain.[46] A palimpsest with a Latin undertext, containing a sermon by St. Augustine, has been described by Ben Outhwaite.[47]

With the more ancient undertexts often the focus of study, the upper texts of fragments from the Cairo Genizah initially received little attention. As mentioned, Neubauer had declared that 'the Hebrew of these fragments is, relatively, of little value'.[48] However, Schechter pointed out that some of the fragments contain an early version of the Palestinian Talmud, that he described as 'very rare',[49] and in 1909, Ginzberg used them for his edition of the Palestinian Talmud.[50] Additional such fragments, exhibiting parts of the tractates Moʿed

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01.07.2023). Von Soden's selection of the most important fragments reflects his research interests, and thus mostly encompasses Biblical texts. This second folder of photographs was thought to have been lost in the turmoil of the Second World War, but resurfaced at the Berlin State Library in 1999, and the photographs are available at https://digital.staatsbibliothek-berlin.de/werkansicht?PPN=PPN685013049&PHYSID=PHYS_0002&DMDID= (accessed 01.07.2023).

38 Bandt and Rattmann, Bruno Violet, 113.

39 Schulthess, *Christlich-palästinische Fragmente*. In 1908 the Christian Palestinian Aramaic fragments were returned with the others.

40 There have been, however, other important discoveries of Islamic palimpsests. See Tuerlinckx, Les palimpsestes; Fedeli, Mingana; Fedeli, Qurʾānic palimpsest; George, Le palimpseste Lewis-Mingana; Hilali, *Sanaa Palimpsest*. Hilali summarizes all known Qurʾān palimpsests in that work, on pp. 13–14. For a recent find, see Suciu, Sahidic Biblical text; *The Guardian*, Passages from the Bible.

41 Goshen-Gottstein, *Bible in its Syropalestinian Version*.

42 Sokoloff and Yahalom, Christian palimpsests.

43 Müller-Kessler and Sokoloff, *Christian Palestinian Aramaic Old Testament*; Müller-Kessler and Sokoloff, *Christian Palestinian Aramaic New Testament*, vol. 1; Müller-Kessler and Sokoloff, *Christian Palestinian Aramaic New Testament*, vol. 2; Müller-Kessler, *Forty Martyrs*.

44 Tchernetska, Greek palimpsests; Tchernetska, Greek Oriental palimpsests.

45 Tchernetska *et al*., Hebrew-Greek Biblical glossary.

46 Olszowy-Schlanger, Book of Kings.

47 Outhwaite, St Augustine.

48 Gwilliam, *Palestinian Version*, v.

49 'He [Schechter] held up a large vellum leaf saying, "This is part of the Jerusalem Talmud, which is very rare; may I take it away?" "Certainly," I [Lewis] replied'. This statement by Solomon Schechter is recorded in Lewis, *In the Shadow of Sinai*, 173.

50 See Ginzberg, *Yerushalmi Fragments*.

Qatan and Sotah, were discovered by Olszowy-Schlanger and Shweka as late as 2013.[51] The Hebrew liturgical poetry found in some fragments, in particular that of Yannai, sparked a new wave of interest.[52] Sokoloff also edited a fragment that contained, as upper text, an early version of the Midrash Bereshit Rabbah.[53]

A paleographic examination of the Hebrew script of the upper texts of fragments found in the Cairo Genizah, provided by Olszowy-Schlanger, has demonstrated that the majority of the upper texts are written in a very similar script and belong to one particular script-type, which she calls an 'Oriental square of the early Western sub-type' and dates to before 1000 CE.[54] This script, she argues, exhibits a certain continuity with the script used in Byzantine Palestine and Egypt.

RULES FOR THE EMPLOYMENT OF PALIMPSESTS IN JUDAISM AND ISLAM

The legal implications of erasing script on manuscripts and documents such as contracts, deeds, and so on, and then rewriting on them, is discussed in both Jewish and Islamic literature. Mishna Avot 4:20 relates the following famous dictum:

> הלומד ילד למה הוא דומה, לדיו כתובה על ניר חדש. והלומד זקן למה הוא דומה, לדיו כתובה על ניר מחוק.
>
> One who learns as a child is similar to what? To ink written on new papyrus. And one who learns as an elder is similar to what? To ink written on erased papyrus.

References to palimpsesting can thus already be found in the Mishnah, compiled at the beginning of the 3rd century CE. The Hebrew term *nᵉyār*, translated here as 'papyrus', referred in antiquity to papyrus, before extending its meaning to paper.[55] The practice alluded to in this passage therefore refers to papyrus, which could be used a second time after the first writing had been removed. And, indeed, the Elephantine papyri and the scrolls found in the Judean Desert reflect such a practice.[56]

In rabbinic literature, discussions on erasing script or rewriting on an erased surface (Heb. *nᵉyār maḥuq* or *sefer she-nimḥaq*) are presented in a number of contexts. First, there is discussion of documents (above all, marriage and divorce contracts, i.e., *ketubbot* and *gittin*) which are written on erased writing material. Using such writing material was permitted under certain conditions, although some sages suspected that this led easily to forgery.[57] Second, the practice of erasing letters is indirectly discussed with regard to the rules of Shabbat, as it is considered labour.[58] Carrying erased writing material as wrapping, for anything the size of a vial of perfume or larger, is also prohibited on the Shabbat.[59]

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[51] Olszowy-Schlanger and Shweka, Newly discovered early palimpsests.

[52] Davidson, *Machzor Yannai*.

[53] Sokoloff, *Genizah Fragments*.

[54] On the script, see Tchernetska *et al.*, Hebrew-Greek Biblical glossary; Olszowy-Schlanger and Shweka, Newly discovered early palimpsests; Olszowy-Schlanger, Greek-Hebrew palimpsests.

[55] In modern Hebrew, it means 'paper'. On the identification of *nᵉyār* with papyrus in rabbinic literature, see Naeh, Qaryana de-ʾigarta.

[56] Most famous among the palimpsested Elephantine papyri is probably the Ahiqar papyrus; see Porten and Yardeni, *Aramaic Documents*, 3:2 and 3:xiii; Sprengling, Aramaic papyri of Elephantine, 350. See also Černý, *Paper and Books*, 23; Caminos, Reuse of papyrus; Declercq, Introduction, 7. On scrolls found in the Judean Desert, see Tov, *Scribal Practices*, 73. For examples of reused papyrus, see Leon Levy Dead Sea Scrolls Digital Library, Jerusalem MS MUR17–2 at https://www.deadseascrolls.org.il/explore-the-archive/manuscript/MUR17-2 (accessed 01.07.2023) or MS MUR10 at https://www.deadseascrolls.org.il/explore-the-archive/manuscript/MUR10-2 (accessed 01.07.2023).

[57] See Mishnah Gittin 2:4: 'Rabbi Judah b. Batera said: One does not write a *get* [a divorce document] on a sheet from which writing has been erased nor on not fully processed writing material, for it can be forged. The sages, however, permit [such a *get*]'. Maimonides, in his Mishneh Torah, specifies that 'He may write it [i.e., a *get*] on writing material from which previous writing has been erased, on only partially treated skin, on a potsherd, on leaves, upon a slave's hand, or a cow's horn, and may then deliver to her the slave, or the cow, or the erased writing material, or the partially treated skin, or the like, in the presence of witness'; see Klein, *Code of Maimonides*, 184 (the text here contains my emendations). See also the discussion concerning the erasure of certain words from deeds, possible affecting the context and the signatures of the witnesses, in Babylonian Talmud Bava Batra 10.

[58] On the prohibition of 'erasing in order to write two letters', see Mishnah Shabbat 7:2.

[59] Mishnah Shabbat 8:2: 'Erased writing material (i.e., papyrus or parchment), as much as is required to wrap round a small vial of perfume'.

Third, the practice is discussed with regard to Torah scrolls, *tefillin* (the parchments inside phylacteries) and *mezuzot* (the parchments fixed to a doorpost), and the validity of these should a letter or a number of letters be erased—the erasure of scribal errors is acceptable and a Torah scroll remains sacred even if partially erased, as long as it still contains eighty-five letters as the section 'And it came to pass when the ark set forward' (Numbers 10:35).[60] Some traditions forbid writing over an erased Torah scroll or writing a Torah on erased writing material. Soferim 3:8, for example, asserts: 'A Torah scroll that has been erased, don't write on it'; conversely, Soferim 1:5 relates that 'it is prohibited to write a Torah scroll on erased writing material'. Modern scholarship has suggested that the word 'erased' in the second quotation is a secondary emendation, and that the passage should therefore be understood rather to prohibit the use of papyrus as a writing material.[61] That later authorities such as Maimonides permitted the reuse of parchment for a Torah scroll seems to support this conjecture.[62]

Although these discussions show that the rabbis were accustomed to the reuse of writing material, both papyrus and parchment, the sources are primarily concerned with the soundness of two types of written texts: documents such as marriage and divorce contracts, and Torah scrolls. This is not surprising, as orality was the dominant mode of transmission of these two types, and so there were specific rules governing the exceptions under which writing them down was acceptable. The rabbinic texts themselves circulated orally and had been edited orally.[63] Only in the 9th century was a general shift to writing compositions down inaugurated, bringing with it not only a bookish and pragmatic literacy, but also a scribal economy that multiplied texts in writing and professionalized the procuring of raw materials such as parchment for this purpose. Rabbinic halakha did not explicitly forbid the use of palimpsested parchment, and the palimpsests from the Cairo Genizah bear evidence to the production of Jewish books on a larger economic scale.

Islamic manuscript production likewise emerged in a context where there had been a strong emphasis on oral transmission in the early period.[64] From the beginning, it was present in an established scribal context, and so we encounter quite early on various discussions of palimpsests.[65] The most elaborated account on this subject comes from Ibn Bādīs (d. AH 454/1062 CE). The ninth chapter of his *ʿUmdat al-kuttāb wa-ʿuddat dhawī al-albāb* (Support of the Scribes and Implements of the Intelligent) is dedicated to the discussion of erasure of various written surfaces *(fī ʿamal mā tumḥā bihi al-kitāba min-ʾl-dafātir wa-ʾl-ruqūq*). Ibn Bādīs provides different methods of erasure, with the main technique in all methods being based on washing (Arab. *ghasl*) with acidic liquids that can remove the ink.[66] However other methods of erasure that are discussed in the literature include rubbing out (*ḥakk*),[67] writing over with ink (*ṭirs* or *ṭils*)[68] and crossing out parts of the text (*ḍarb*).[69] The practice of reusing parchments as written material is thus not seen as prohibited by Muslim

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[60] Therefore it causes impurity, see Mishnah Yadayim 3:5, and has to be rescued from fire, see Babylonian Talmud Shabbat 16. The latter passage is discussed in Olszowy-Schlanger, Book of Kings, 240.

[61] See Tov, *Scribal Practices*, 73; Schiffman, Jerusalem Talmud Megillah 1, 100.

[62] Cf. Maimonides, 'It is permissible to write God's name in them all [i.e., Torah scrolls, *tefillin* and *mezuzot*] in places where the writing had been scraped away or erased'; Kellner, *Code of Maimonides*, 76.

[63] See Jaffee, Writing and rabbinic oral tradition; Jaffee, Rabbinic authorship; Alexander, *Transmitting Mishnah*; Alexander, Orality; Rosen-Zvi, Orality, narrative, and rhetoric; Hezser, Bookish circles?

[64] On the oral context of early Islamic literature, see Schoeler, Writing and publishing; Schoeler, *Literature in Islam*; Schoeler, *Oral and Written*.

[65] See also the contribution of Alba Fedeli in this volume for a discussion of palimpsesting practices in Islamic, particularly Qurʾānic, manuscripts.

[66] See Ibn Bādīs, *ʿUmdat al-kuttāb*, 81–83; an English translation is provided by Levey, Mediaeval Arabic bookmaking, 36–37. See also Hilali, *Sanaa Palimpsest*, 8–13. Abū Saʿd, *Adab al-imlāʾ*, 551 provides two important accounts of washing; see also al-Zayyāt, al-Julūd, 1361, 1365–1366. Washing out a text was not only practiced as a means to allow reuse, but also as a ritualized withdrawal from circulation resulting from an esteem for, a special care for, or a fear of desecration of the written word; see Sadan, Used sacred books; Sadan, Genizah and Genizah-like practices; Sadan, Disposal of books. Further, washing was used to withdraw non-canonical versions, especially of the Qurʾān; see Hilali, *Sanaa Palimpsest*, 7–8, 9. See also al-Kulaynī (d. AH 329/941 CE), *al-Kāfī*, vol. 1, 673–674, on the preference for washing over burning.

[67] The most important account of this practice, mostly dealing with *ḥadīth* books, is found in Ibn al-Ṣalāḥ (d. AH 643/1245 CE), *Muqaddimat Ibn al-Ṣalāḥ*, 382ff.

[68] The term *ṭirs* is found also as *ṭils,* the latter seemingly secondary to the first. Both denote the process by which writing is erased and becomes no longer readable. See Gacek, *Arabic Manuscript Tradition*, 91, 93; Abū Bakr Muḥammad (d. AH 335/946 CE), *Adab al-kātib*, 137.

[69] In the opinion of al-Rāmahurmuzī (d. AH 360/971 CE), if a manuscript contains a mistake, the best way to correct it is to cross out

scholars. A more practical position prevailed rather than a religious prohibition in this regard, although scribes and all others who were involved in writing processes were required to observe certain pious behaviour, in particular for religious texts.[70]

STATISTICS

The following tables offer statistics for both the Cairo Genizah and Qubbat al-Khazna palimpsests. For each set, the data gives the number and percentage of fragments with each language as undertext and as upper text, as well as giving the figures for the genre of the *scriptio superior*. The data is based on the two lists of palimpsests given in the appendix, to which the reader is referred for details.[71]

1. Cairo Genizah

Language of undertext		
Christian Palestinian Aramaic	58	55%
Hebrew / Judaeo-Arabic and Hebrew / Greek and Hebrew	16	15%
Greek	15	14%
Syriac	6	6%
Georgian	4	4%
Arabic	3	3%
Coptic	2	2%
Latin	2	2%
Language of upper text		
Hebrew / Hebrew and Aramaic	102	96%
Judaeo-Arabic / Judaeo-Arabic and Hebrew	4	4%
Genres represented in the upper text		
Palestinian Talmud	38	36%
midrash	34	32%
piyyut	18	17%
masorah	4	4%
Babylonian Talmud	2	2%
other	10	9%

2. Qubbat al-Khazna

Language of undertext		
Christian Palestinian Aramaic	20	53%
Greek	12	32%
Syriac	5	13%
Coptic	1	3%
Hebrew	1	3%

part of the text (*ḍarb*), so that the error can be still be read. Scratching off the surface could lead to falsification, and so the scribe who does that is suspicious (Arab. *tuhma*); see al-Rāmahurmuzī, *al-Muḥaddith al-fāṣil*, 606. The same opinion is expressed by al-Jāḥiẓ (d. AH 255/868 CE), Riṣālat al-jidd, 253 and by Ibn al-Ṣalāḥ, *Muqaddimat Ibn al-Ṣalāḥ*, 382.

[70] For a general account, see the anthology of al-Rashīd, *al-Mutḥaf,* for instance at 36–47, 108–11, 158–174, 204–207, 419–421, 466–469, 640–2, 663–70, 688–689.

[71] For additional comparisons with the Sinai palimpsests, see the contribution by Claudia Rapp in this volume.

Language of upper text		
Arabic	31	82%
Syriac	4	11%
Greek	3	8%
Genres represented in the upper text		
Qurʾān	10	26%
Christian literature (Arabic and Syriac)	5	13%
medical or natural sciences	4	11%
Islamic literature	1	3%
Greek literature	1	3%
unidentified	17	45%

In the Cairo Genizah, only sixteen of the undertexts are written in Hebrew or Hebrew in combination with another language. However, the Greek undertexts, especially for those that preserve parts of the Hebrew Bible/Old Testament in Greek, might also have been produced by Jewish scribes.[72] Some, in fact, provide strong indications of this: the occurrence of the Jewish version of Aquila and the employment of Paleo-Hebrew script for the Tetragrammaton.[73] Both are featured in two fragments that need to be added to the sixteen above, accounting for 17% in total. They are the result of inner-communal trade—the remaining fragments originate from non-Jewish communities. Among the palimpsests of the Qubbat al-Khazna, three contain a Christian upper text in Arabic on a Christian undertext (in Christian Palestinian Aramaic). Two exhibit Syriac on Syriac. They together make for 13% exhibiting identified upper texts of a Christian provenance. Excluding the unidentified texts, the remainder show upper texts of Muslim origin (including 26% that reflect the Qurʾān) on undertexts with a non-Muslim provenance.[74]

A great number of the Cairo Genizah palimpsests exhibit rabbinic texts as their *scriptio superior*: talmudic texts (38% of the palimpsests), midrash (32%), and piyyut (17%). It has previously been noted that all of these texts are Palestinian in terms of their geographic provenance.[75] This is reflected in the fact that 36% of the palimpsests show the Palestinian Talmud, while its Babylonian counterpart only amounts to 2%. Similarly, the piyyut (17%) and masorah (4%) are explicitly Palestinian in their origin. Some fragments even use Palestinian vocalization signs (e.g., T-S 12.741).

As well as showing this shift in genre, the palimpsests attest to another shift, namely a shift in language. The greatest percentage of undertexts in both groups of palimpsests are written in Christian Palestinian Aramaic (55% in the Cairo Genizah; 53% in the Qubbat al-Khazna). Between the 5th and the 8th centuries, Christian Palestinian Aramaic was a spoken language and a language of liturgy.[76] The monastic communities of the Judean Desert and Jerusalem had a centuries-old custom of providing interpreters for speakers of Christian Palestinian Aramaic. Even before the 5th century, a testimony of this is found in the travelogue of a 4th-century pilgrim to the Holy Land:

> In this province, there are some people who know both Greek and Syriac (i.e. Christian Palestinian Aramaic), but others only know one or the other. The bishop may know Syriac, but he never uses it. He always speaks in Greek, and has a presbyter beside him who translates the Greek into Syriac, so that everyone can understand what he means.[77]

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[72] Some of the undertexts in Greek, such as those exhibiting the New Testament, can certainly be excluded from a Jewish production context, on the basis of their content.

[73] On this issue, see Tchernetska, Greek Oriental palimpsests, 250–251, as well as Burkitt and Taylor, *Book of Kings*, 15–16.

[74] As was also the case for the Mingana Palimpsest, which also contained several Christian texts, in Syriac and Arabic, as undertexts. See Fedeli, Mingana; Fedeli, Qurʾānic palimpsest; George, Le palimpseste Lewis-Mingana.

[75] See Tchernetska *et al*., Hebrew-Greek Biblical glossary; Olszowy-Schlanger and Shweka, Newly discovered early palimpsests; and Olszowy-Schlanger, Greek-Hebrew palimpsests.

[76] To be precise, Christian Palestinian Aramaic remained in limited use also after the 8th century. For a short renaissance between the 10th and 13th centuries, see Morgenstern, Christian Palestinian Aramaic.

[77] As translated in Wilkinson, *Egeria's Travel*, 146. Scholars have no doubt that the Christian Palestinian Aramaic version of the Bible derives from these oral interpretations; see, for example, Lagrange, L'origine de la version syro-palestinienne.

However, Arabic later became the language of the local lay population, who had previously spoken Christian Palestinian Aramaic—the Arabization of the region was more inclusive and more rapid than its Islamization—and this appears to have brought about the gradual decline of Christian Palestinian Aramaic.[78]

This Arabization is reflected in the palimpsests. Of the palimpsests from the Qubbat al-Khazna, 82% have an Arabic upper text (29% are Islamic and 13% Christian Arabic and Syriac texts, with the remainder unidentified or not affiliated with either religion); and the Cairo Genizah exhibits 4% of Judaeo-Arabic upper texts. The decline of Christian Palestinian Aramaic as a productive language, it appears, must have eventually led to the disassembling of books composed in this language and the reuse of their writing material.

A similar situation would seem to prevail for books in Greek, though to a much lesser extent. Greek undertexts are found in 14% of the Cairo Genizah palimpsests and 32% of those in the Qubbat al-Khazna.

CONCLUSION

Although there remains much more to be explored, I have proposed in this survey an initial step toward outlining the practice of palimpsesting in the Near East. The major sites where palimpsests have been found form a neat triangle: Cairo, St. Catherine's in Sinai, and Damascus. The historical discovery of all three find spots was achieved by members of a closely-connected network of scholars, for the most part driven by the hope of discovering old, forgotten, Biblical texts. The ensuing publications excited scholars, with attention focused at first on the undertexts. The very first Genizah fragments, which were in fact palimpsests containing Christian Palestinian Aramaic, were published by Gwilliam a few years before Schechter's mission to Cairo procured a large part of the collection and made it known to a wider audience—for which he depended on the momentous help of Lewis and Gibson, experienced hunters of palimpsests in Syriac and Christian Palestinian Aramaic.

In terms of their communities of origin, the Near East palimpsests represent the three major religions of the region: Jews, Christians, and Muslims. Not only did all three communities produce books using washed and reused parchment, but the upper texts and undertexts in their various combinations form the layers of an intellectual texture that, in the words of Hava Lazarus-Yafeh, can itself be described as a 'palimpsest, layer upon layer, tradition upon tradition, intertwined to the extent that one cannot really grasp one without the other, certainly not the later without the earlier, but often also not the earlier without considering the shapes it took later'.[79] Palimpsests provide, both physically and metaphorically, a stratigraphic record of the cultural and intellectual history of the Near East.

An examination of the rules for the employment of palimpsests in Judaism and Islam yielded a relative laxness in both Jewish and Islamic sources. These sources show, above all, that the erasure or washing of writing material was commonly practised, and to a large extent permissible.

However, the rabbinic texts describe a Jewish scribal culture that is distinct from that which we encounter in the fragments in the Cairo Genizah. Those texts are concerned with two main types of writing—liturgical Torah scrolls (*tefillin* and *mezuzot*) on the one hand, and documents such as marriage and divorce contracts on the other—and much of the discussion is centred around the reuse of papyrus. This conforms closely to what we know about rabbinic scribality: rabbinic texts, with the exception of the abovementioned categories, emerged orally.[80] Only the final stage of this process resulted in a text in a definite, fixed, and written shape. Composition itself remained an act of oral study or recitation.[81] The earliest evidence of a written Talmud dates only to the 9th century, although the ideological prohibition against writing down the oral Torah had been broken as early as the Amoraic period (ca. 200–500 CE), as recent scholarship has demonstrated. It has been suggested that, even though parts of the rabbinic literature were committed to writing at an early date, texts were still transmitted orally in the Geonic period (traditionally dated 589–1038 CE).[82] In discussing the reuse of writing material, then, rabbinic literature reflects this older Jewish scribal culture, in which the use of writing

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[78] Rubin, Arabicization versus Islamization.

[79] Lazarus-Yafeh, *Intertwined Worlds*, 4.

[80] The Jewish papyri that survive from the pre-Islamic period support this picture: there we mostly find liturgical texts, documents, and private letters, but no rabbinic literature. See Sirat, *Papyrus en caractéres hébraïques*.

[81] See the references in fn. 63, and also Brody, *Geonim of Babylonia*, 156–161.

[82] See, for example, Elman, *Authority and Tradition*; Naeh, Structure and division; Mandel, Between Byzantium and Islam.

was restricted to particular categories, and the practice of palimpsesting is discussed in accordance with that; however, the fragments from the Cairo Genizah exhibit a scribal culture in which writing had shifted to being the dominant mode of circulation of texts, thus requiring a steady supply of writing material.

Finally, the practice of palimpsesting has to be understood primarily in the context of a book economy, as providing lesser quality and therefore cheaper writing material. This economy seems to be actuated by the two dynamics described above: a shift to written composition, and a shift in language that made books in the languages used in the region before the dominance of Arabic more prone to reuse. The trade seems to have had its centre in Palestine, given both the Palestinian character of the Jewish upper texts and the high presence of Christian Palestinian Aramaic in undertexts. Further, the trade in reused parchment was noticeably trans-denominational; within it, confessional boundaries seem to blur.

APPENDIX

1. Palimpsests from the Cairo Genizah

The list below offers an inventory of all palimpsests from the Cairo Genizah known to date, as identified in previous catalogues and secondary literature, as well as in the catalogues of the Friedberg Jewish Manuscript Society.[83] It is not unlikely that a systematic sifting through the various Genizah collections—aided by multispectral imaging techniques—will yield further fragments and contribute to the identification of hitherto unidentified undertexts. This, however, has to remain a *desideratum* to be fulfilled in the future.[84]

In this table, 'PT' represents the Palestinian Talmud, and 'BT' the Babylonian Talmud.

	Shelf mark	***Scriptio inferior***		***Scriptio superior***	
		Language/script	Text	Language/script	Text
	Cambridge University Library				
1	T-S F17.4	Hebrew and Greek	Hebrew and Greek glossary on Biblical words	Hebrew and Aramaic	PT Sotah 8:5–9:4
2	T-S K23.1	Hebrew	BT Ketubbot 101a; 107b–108b	Hebrew and Aramaic	Halakhot Gedolot, Shekhitat Hullin
3	T-S K23.3 (1)	Hebrew	Halakhot Gedolot, Pesaḥ	Hebrew	magical
4	T-S K23.3 (2)	Hebrew	ketubbah	Hebrew and Aramaic	Sefer ha-Razim
5	T-S K23.3 (3)	Hebrew	unidentified	Hebrew	piyyut
6	T-S K23.4	Hebrew	unidentified	Hebrew	Tanhuma
7	T-S K23.5	Coptic	liturgical	Hebrew and Judaeo-Arabic	children's exercise, lists
8	T-S 12.188	Greek	Aquila, Psalms	Hebrew and Aramaic	PT Moʿed Qatan 1:1–3
9	T-S 12.189	Greek	Acts 24:22–25; 1 Pet 2:22–3:7	Hebrew	Bereshit Rabbah
10	T-S 12.191	CPA	Sir 18:17–19:1	Hebrew	Pesiqta of Rab Kahana
11	T-S 12.208	Greek	Acts	Hebrew	Bereshit Rabbah
12	T-S 12.209	CPA	unidentified	Hebrew	Sifra
13	T-S 12.210	CPA	1 Kgs 14:21–15:4	Hebrew	piyyut
14	T-S 12.211	CPA	Jn 11:56–12:16	Hebrew and Aramaic	PT Sanhedrin 19c (56)–20a (6); 29a (61)–29b (30)

[83] https://fjms.genizah.org/ (accessed 01.07.2023).

[84] As an example of multispectral imaging techniques on Genizah fragments, see Schmierer-Lee, Palimpsests?

	Shelf mark	*Scriptio inferior*		*Scriptio superior*	
		Language/script	Text	Language/script	Text
15	T-S 12.735	CPA	2 Sam 6:19–7:7	Hebrew and Aramaic	PT Sanhedrin 19c (56)–20a (6); 29a (61)–29b (30)
16	T-S 12.735 (small fragment)	CPA	unidentified	Hebrew	Bereshit Rabbah
17	T-S 12.739	Coptic	*Life of St. Macarius the Great*	Hebrew	piyyut
18	T-S 12.741	Georgian	Jer 12:10–11, 15–16, 26–27; 18:2–8; 20:9–16	Hebrew and Aramaic	PT Bava Qamma 6–8
19	T-S 12.742	CPA	Is 36:15–37:4	Hebrew and Aramaic	PT Eruvin 18c, d
20	T-S 12.743	Syriac	Sir 13:1–14	Hebrew	Midrash Mishle
21	T-S 12.744	CPA	Epistle of Jeremiah 44–54	Hebrew	Bereshit Rabbah
22	T-S 12.745	CPA	Epistle of Jeremiah 33–44	Hebrew	Bereshit Rabbah
23	T-S 12.746	CPA	*Life of Abraham of Qidun*	Hebrew and Aramaic	PT Pe'ah 5:2–6; 7:3–5
24	T-S 12.747	Syriac	unidentified	Judaeo-Arabic	treatise on medicine
25	T-S 12.748	CPA	*Symboli Nicaeni Fragmentum*	Hebrew and Aramaic	PT Shevuʿot 32
26	T-S 12.749	CPA	*Life of Philemon*	Hebrew and Aramaic	PT Shevuʿot 32
27	T-S 12.750	CPA	*Life of Philemon*	Hebrew and Aramaic	PT Shevuʿot 32
28	T-S 12.751	CPA	*Life of St. Anthony* by Athanasius of Alexandria	Hebrew and Aramaic	PT Betzah 1
29	T-S 12.752	CPA	*Life of St. Anthony* by Athanasius of Alexandria	Hebrew and Aramaic	PT Betzah 60
30	T-S 12.753	CPA	*Life of St. Anthony* by Athanasius of Alexandria	Hebrew and Aramaic	PT Betzah 60
31	T-S 12.754	Syriac	Ez 20:9–15	Hebrew	piyyut
32	T-S 12.755–756	CPA	1 Cor 5:10–13; 5:13–6:1	Hebrew and Aramaic	PT Sotah 23d–24a
33	T-S 12.757	CPA	unidentified	Hebrew	piyyut
34	T-S 12.758	CPA	unidentified	Hebrew and Aramaic	PT Sanhedrin
35	T-S 12.759	CPA	unidentified	Hebrew and Aramaic	PT Horayot 48a
36	T-S 12.764	Hebrew	unidentified	Hebrew	responsa, Psalms 113–115
37	T-S 16.93	Greek	New Testament lectionary (Gospels; Mt 10:2–15; Jn 20:11–15)	Hebrew	Sifra
38	T-S 16.98	CPA	Jn 14:25–15:16	Hebrew	piyyutim by Yannai
39	T-S 16.319	CPA	*Life of St. Anthony* by Athanasius of Alexandria	Hebrew and Aramaic	PT Pe'ah 18d; 20b–c
40	T-S 16.320	Greek	Pss 143:1–144:6	Hebrew and Aramaic	PT Moʿed Qatan 82a–b; 83b
41	T-S 16.322	CPA	Jer 12:12–15; 13:1–65; 14:4–7	Hebrew	Bereshit Rabbah

	Shelf mark	*Scriptio inferior*		*Scriptio superior*	
		Language/script	Text	Language/script	Text
42	T-S 16.323	CPA	Jer 29:32–30:10; 31:4–20	Hebrew	Bereshit Rabbah
43	T–S 16.324	CPA	Jer 31:35–32:2; 32:35–44	Hebrew	Bereshit Rabbah
44	T-S 16.325	CPA	Hosea 14:4–10; Joel 1:1–2:20	Hebrew and Aramaic	PT Eruvin 20d–21d
45	T-S 16.326	CPA	1 Thes 3:1–13; 4:1–14	Hebrew and Aramaic	PT Eruvin 20d–21d
46	T-S 16.327	CPA	unidentified	Hebrew	Sifra
47	T-S 16.328	CPA	unidentified	Hebrew and Aramaic	PT Pesahim 37c–d
48	T-S 16.329	CPA	*Life of St. Anthony* by Athanasius of Alexandria	Hebrew and Aramaic	PT Sheqalim, 44a–b; 46b
49	T-S 16.351	CPA	unidentified	Hebrew	Pesiqta of Rab Kahana
50	T-S 20.50	Greek	Aquila's Greek translation of 2 Kgs 23:11–27	Hebrew	piyyut
51	T-S 20.157	CPA	2 Cor 3:2–4:10	Hebrew and Aramaic	PT Sotah 24a–b; 22b–c
52	T-S 20.158	CPA	2 Tim 2:16–26; Titus 3:3–12	Hebrew	Pesiqta of Rab Kahana
53	T-S 20.182	CPA	Dt 31:3–8, 11–14, 19–20, 25–29; Jn 14:15–19	Hebrew	piyyut
54	T-S NS 172.11	Hebrew	Bible in shorthand writing ('Serugin'), 1 Chr 2:25–3:9; 3:16–6:33	Hebrew	piyyut
55	T-S NS 200.49	CPA	Jer 37:19–38:2; 38:3–6	Hebrew	Bereshit Rabbah
56	T-S NS 249.6	Hebrew	Bible in shorthand writing ('Serugin'), 1 Chr 2:25–3:9; 3:16–6:33	Hebrew	piyyut
57	T-S NS 249.14	CPA	2 Kgs 1:12–2:3	Hebrew	piyyut
58	T-S NS 258.140	Syriac	unidentified	Hebrew	Sifra
59	T-S NS 301.63	Greek	unidentified	Hebrew	piyyut
60	T-S NS 313.31a–b	Arabic	unidentified	Hebrew and Aramaic	BT Hullin 27a–31a
61	T-S NS 325.56C	Hebrew and Judaeo-Arabic	legal deed (?)	Hebrew and Aramaic	ketubbah
62	T-S NS 329.300–301	CPA	Isaiah (?)	Hebrew and Aramaic	PT Eruvin 18c-d
63	T-S NS 329.844–845	CPA	Jer 36:1–4, 25–44; 37:5–10	Hebrew	Bereshit Rabbah
64	T-S NS 329.968	CPA	*Life of Philemon*	Hebrew and Aramaic	PT Shevuʿot 32
65	T-S AS 78.170	Hebrew	unidentified	Hebrew	Tanhuma
66	T-S AS 78.324	CPA	Acts 25:1–11; 27:4–14	Hebrew and Aramaic	PT Yoma 41a–42d
67	T-S AS 78.402 + 410	CPA	Jn 15:4–7, 16–19	Hebrew and Aramaic	PT Sanhedrin 4:22a–b
68	T-S AS 78.405	CPA	Gen 49:24; 49:33–50:1	Hebrew and Aramaic	PT Sanhedrin 18b

	Shelf mark	*Scriptio inferior*		*Scriptio superior*	
		Language/script	Text	Language/script	Text
69	T-S AS 78.411	Greek	unidentified	Hebrew and Aramaic	PT Bava Qamma 1:3–2:1
70	T-S AS 78.412	Greek	Pss 96:7–98:3	Hebrew and Aramaic	PT Taʿanit, Moʿed Qatan
71	T-S AS 79.31	Arabic	unidentified	Hebrew and Aramaic	PT Shabbat
72	T-S AS 93.524	Greek	unidentified	Hebrew	Bereshit Rabbah
73	T-S AS 95.35	Arabic	unidentified	Hebrew and Aramaic	BT Hullin 19
74	T-S AS 124.1	Georgian	unidentified	Hebrew	piyyut
75	T-S AS 139.1	Latin	St. Augustine's *De Sermone Domini in Monte*	Hebrew	masorah
76	Or. 1080 1.39	Greek	unidentified	Hebrew	Bereshit Rabbah
77	Or. 1080 4, a–b	CPA	Jer 36:1–4, 25–44; 37:5–10; 38:7, 12	Hebrew	Bereshit Rabbah
78	Or. 1080 4.52	Greek	unidentified	Hebrew	Bereshit Rabbah
79	Add. 4320, a–d	Latin	St. Augustine's *De Sermone Domini in Monte*	Hebrew	masorah
	Cambridge, Lewis-Gibson (formerly Westminster)				
80	Glas I AB fols. 1–2	CPA	unidentified	Hebrew and Aramaic	PT Horayot 48a
	Geneva, Bibliothèque de Genève				
81	MS 17	Greek	martyrological text	Hebrew	piyyut
	London, British Library				
82	Or. 6581.1	CPA	Jer 31:21, 28	Hebrew	Bereshit Rabbah
83	Or. 6581.2	Georgian	Jer 12:10–16	Hebrew and Aramaic	PT Bava Qamma 4d–5a
	New York, Jewish Theological Seminary of America				
84	MS Lutzki 273.3	Hebrew	unidentified	Judaeo-Arabic	polemics
	Manchester, John Rylands Library				
85	AF 299	CPA	unidentified	Hebrew and Aramaic	PT Yoma 41a–42d
86	Genizah fragment 49	CPA	unidentified	Hebrew	piyyut
	St. Petersburg, Russian National Library				
87	Antonin Yevr. III B 958	CPA	Epistle of Jeremiah 54–63	Hebrew	Bereshit Rabbah
	Oxford, Bodleian Libraries				
88	Heb. a. 3.30	Hebrew	letter (?)	Hebrew and Judaeo-Arabic	masorah/exegesis
89	Heb. b. 13.12	CPA	Lam 1:10–18	Hebrew	Bereshit Rabbah
90	Heb. b. 13.13	CPA	Jer 52:22–29	Hebrew	Bereshit Rabbah

	Shelf mark	*Scriptio inferior*		*Scriptio superior*	
		Language/script	Text	Language/script	Text
91	Heb. b. 13.14	CPA	unidentified	Hebrew	Sifra
92	Heb. d. 54.1	CPA	unidentified	Hebrew and Aramaic	PT Moʿed Qatan
93	Heb. d. 59.36–40	Hebrew	unidentified	Hebrew	piyyut
94	Heb. d. 62.2	Syriac	unidentified	Hebrew	piyyut
95	Heb. d. 62.20	Syriac	unidentified	Hebrew	masorah
96	Heb. e. 25.72	Hebrew	unidentified	Hebrew	piyyut
97	Heb. e. 73.42	CPA	Jer 21:1–22:3	Hebrew	Bereshit Rabbah
98	Heb. e. 73.43	CPA	Jer 38:14–22	Hebrew	Bereshit Rabbah
99	Heb. f. 27.10–22	Hebrew	1 Kgs 19:8–21	Hebrew	book of legal formularies
100	Georg. c.1(P)/1	Georgian	Jer 17:26–18:8	Hebrew and Aramaic	PT Bava Qamma 4:10–5:5
101	Syr. c. 15–18 (P) (formerly C. 4)	CPA	Num 4:46, 47; 4:49–5:2; 5:3, 4, 6–8; Col 4:12–18; 1 Thes 1:1–3; 4:3–15; 2 Tim 1:10–2:7; Titus 1:11–2:8	Hebrew and Aramaic	Mishnah Hullin 4:6–end; Mishnah Bechorot 1:1–8:8
102	Syr. d. 32.1–4 (P)	CPA	Ex 28:1–12; Wis 9:8–10:2	Hebrew	Sifra
	Paris, BnF				
103	Heb 1489.1	Greek	unidentified	Hebrew and Aramaic	PT Moʿed Qatan 8a–4:9b
104	Heb 1489.9	CPA	unidentified	Hebrew and Aramaic	PT Sotah 22c–d
	Philadelphia, University of Pennsylvania Museum Collection				
105	E 16507	CPA	Ez 22:11–20	Hebrew	Bereshit Rabbah
	Center for Advanced Judaic Studies				
106	Halper 114	Greek	unidentified	Hebrew	Early midrash on Gen 40:18–41:3; 46:28–47:1

2. Palimpsests from the Qubbat al-Khazna

The list below is drawn from three different sources: first, the photographs that are now preserved at the Berlin State Library;[85] second, the photographs preserved at the Berlin-Brandenburg Academy of Sciences and Humanities;[86] and third, Schulthess's work.[87] While partly overlapping, these three complement each other. Schulthess consulted the fragments while they were still in Berlin (see discussion above), and not all of the fragments described and edited were photographed. Where possible, I have marked the overlap.

	Shelf mark	*Scriptio inferior*		*Scriptio superior*	
		Language/script	Text	Language/script	Text
	Berlin State Library, Or. sim 6				
1	3r–4r	Greek	Esther 8:12	Arabic	Qurʾān 7:155–162; 7:162–172[88]
2	5r–6r (= Schulthess VI)	CPA	Eccl 11:2–8	Arabic	text about the coming of the Messiah
3	9r–10r (= Schulthess VIII)	CPA	Lk 19:42–20:6	Arabic	medical (?)
4	11r–12r (= Schulthess I)	CPA	Gen 19:1–5, 7–10	Arabic	*Mukhtaṣar fī al-ṭibb*, Abū Marwān ʿAbd al-Malik b. Ḥabīb al-Sulāmī[89]
5	27r–28r	Coptic	Fayyumic fragment of Mt	Arabic	hadith (?)
6	33r–42r	Hebrew	Job 31	Syriac	Liturgical (Melkite)[90]
	Berlin-Brandenburg Academy of Sciences and Humanities, BBAW/GCS, Akz.-Nr. 481				
7	Image 26/27	Greek	1 Kgs 18:26–33; 18:41–19:2; 20:11–14; 22:6–10	Arabic	Exodus 3:18–4:25; 4:27–6:14; 6:16–8:2; 8:4–15
8	Image 28/29	Greek	unidentified	Arabic	unidentified
9	Image 32/33	Greek	Lk 10:19–22	Arabic	unidentified
10	Image 34–39 (= Schulthess XVIII)	CPA	Lucian's epistle	Arabic	Qurʾān 7:42–57
11	Image 40/41a	CPA	unidentified	Arabic	unidentified
12	Image 40/41b	CPA	unidentified	Arabic	unidentified
13	Image 181	Syriac	unidentified	Syriac	liturgical (Syriac Orthodox)[91]
14	Image 193/194	Greek	unidentified	Greek	unidentified
15	Image 197–202	Syriac	unidentified	Syriac	unidentified
16	Image 203	Greek	unidentified	Arabic	unidentified
17	Image 204/205	Greek	Wis 10:19–11:4; 11:5–11	Greek	Aristotle, *On Interpretation*

[85] https://digital.staatsbibliothek-berlin.de/werkansicht?PPN=PPN730121836&PHYSID=PHYS_0005&DMDID= (accessed 01.07.2023).
[86] https://bibelexegese.bbaw.de/handschriften/damaszener-handschriften/ (accessed 01.07.2023).
[87] Schulthess, *Christlich-palästinische Fragmente*.
[88] See the contribution of Alba Fedeli in this volume, who describes this fragment in great detail.
[89] The identification is by Matteo Pimpinelli, see his *Due frammenti inediti*.
[90] See Kessel, Fragments of Syriac manuscripts, 281
[91] See Kessel, Fragments of Syriac manuscripts, 280.

	Shelf mark	*Scriptio inferior*		*Scriptio superior*	
		Language/script	Text	Language/script	Text
18	Image 206a	Syriac	Gen 49	Syriac	Isaac of Nineveh, *First Part*
19	Image 206b	Greek	unidentified	Arabic	unidentified
20	Image 207/208	Syriac/Greek	1 Sam 7:16–8:9; 10:5[92] (Syriac), unidentified (Greek)	Arabic	unidentified
21	Image 209/210	Greek	unidentified	Arabic	unidentified
22	Image 211	Greek	Gal 5:13–17	Arabic	unidentified
23	Image 212	Greek	Song of Sol. 2:1–6; 2:17–3:2; 5:8–13	Arabic	unidentified
24	Image 197–203	Syriac	unidentified	Syriac	liturgical (Syriac Orthodox)[93]
	Schulthess				
25	II	CPA	Gen 49:24–50:12; Eccl 7:10–24; Sir 46:4–8; Mk 13:20–32; Jn 11:31–41	Arabic	unidentified
26	III	CPA	Ex 36:16–18, 20–23; 39:11, 14, 39–40; 40:4–17	Arabic	Qurʾān 2
27	IV	CPA	Num 13:19–33	Arabic	Qurʾān 7
28	IX	CPA	Jn 11:8–9, 20–22	Arabic	unidentified
29	X	CPA	Jn 11:44–54	Arabic	medical (?)
30	XI	CPA	Jn 11:25–35	Arabic	apocrypha (?)
31	XII	CPA	2 Pet 3:1–11	Arabic	Qurʾān 11:85–120
32	XIII	CPA	Rom 1:14–27; 3:25–4:9	Arabic	unidentified
33	XIV	CPA	Phil 1:25–2:12; 3:18–4:23; Col 1:1–9; 2:15–3:12; 1 Cor 9:23–10:15; 12:21–13:7		Qurʾān 51:47–59:21
34	XV	CPA	Eph 6:19–24; Phil 1:1–9; 3:8–4:1; Hebrews 1:1–2:4; 4:10–6:4; 7:16–8:5	Arabic	Qurʾān 6:164–27:37; 27:84–28:38
35	XVI	CPA	apocryphal Gospels	Arabic	Qurʾān 27:37–84
36	XVII	CPA	1 Sam 7:14–8:9	Arabic	medical (?)
37	XX	CPA	apocryphal Gospels	Arabic	Qurʾān 6:49–64; 34:8
38	XXI	CPA	apocryphal Gospels	Arabic	Qurʾān (?)

[92] See Kessel, Fragments of Syriac manuscripts, 276–277.
[93] See Kessel, Fragments of Syriac manuscripts, 281.

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Deposits of Texts and Cultures in Qurʾānic Palimpsests: A Few Remarks on Objects and Dynamics in Palimpsesting

1. PALIMPSESTS, *CODICES RESCRIPTI*, ERASED PARCHMENTS: TECHNIQUES AND INTENTIONS IN REUSING MATERIALS

Knowledge of the reuse of documents is well-attested in both the Graeco-Latin tradition and the Arabic sources. Thus, for example, Catullus, Cicero and Plutarch wrote about materials to be reused (the *palimpseston*) in the Roman empire,[1] while a few centuries later, in the Islamic empire, accounts of the canonization of the ʿUthmānic text reported the phenomenon of using effaced or washed parchment for writing the Qurʾānic text.

The terminology used to describe manuscript reuse in the different traditions can be diverse. The derivation of the term 'palimpsest' refers to the technique of repeated scraping and erasing of text written on a surface in order to write new texts, and thus can refer to several different scenarios, such as scraping in order to reuse writing materials, erasure in order to amend a text, and retracing to restore faded inks. Similarly, the terminology *(codex) rescriptus* is ambiguous, as it does not clarify the purpose of the act of writing a second time, which could include reuse, restoration, or correction of a text.[2] This article will focus primarily on the recycling of manuscript materials rather than on all possible ways a text might be changed or adjusted by erasures and rewriting. In this sense, the phenomenon of palimpsesting is characterized by the intention of reusing and reallocating resources, rather than the technique of erasing, washing, or scraping. Therefore, not all the parchment surfaces that have been partially cancelled in a manuscript object to replace a section of the text with a revised version of the same text can be defined as palimpsests *stricto sensu*. The Arabic terminology employs—among others—the words *ṭirs* and *ṭils*, both referring to 'effacement' and 'obliteration', being a text of which the writing has been obliterated or effaced—in an effective way in the former case, but an ineffective way in the latter—thus enabling the material to be used again for a new act of writing.[3]

On the basis of this, for example, I interpret the Vienna palimpsest (A.Perg.2, ÖNB, Papyrussammlung) as a non-palimpsest in a proper sense of reuse of the original material surface to produce a new, different, object; the faded traces of a *scriptio inferior* are simply signs of rewriting of the same text by two scribes in a single session, possibly in an educational context.[4] An interesting point to emphasise in relation to this leaf is the fact that part of the same section of the Qurʾānic text was rewritten twice in the *scriptio superior* on the same page.

The case of a manuscript in Istanbul offers a similar example, connected with the ambiguity of the use of the term palimpsest. In his catalogue of the oldest Arabic manuscripts from all over the world, Kūrkīs ʿAwwād lists the manuscripts held at the Topkapı Sarayı, observing the presence of a Qurʾānic palimpsest (*raqq mabšūr*, i.e. 'shaved off or scraped off parchment').[5] This is manuscript E.H.29, composed of 147 leaves, measuring 12 × 18.5 cm with a text area of about 9 × 13 cm of seven lines per page arranged in an oblong format. The

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1 See for example Cicero, *Epistulae ad familiares* VII, 18; Catullus, *Carmina* 22, 5 and Plutarch, *Moralia*, *De garrulitate*, 504D.

2 On the terms palimpsest, *codex rescriptus*, and *chartae rescriptae*, see Agati, *Manuscript Book*, 70.

3 On the Arabic terminology used for palimpsested surfaces and manuscripts, see Gacek, *Arabic Manuscript Tradition*, 91, 93.

4 See Fedeli, Non Palimpsest. Initially, in 2005, I read a few letters in the outer margins of the recto, through direct inspection of the object, as signs of simultaneous corrections in a teaching context. After submission of this article, thanks to the kind collaboration of Bernhard Palme, Director of the Papyrology Collection in Vienna, I was able to look at the special multispectral images of A.Perg.2 with Mike Phelps, Roger Easton, and Keith Knox, who patiently and efficiently processed the images in several steps to improve its readability. The overlapping of two hands in writing both *scriptio inferior* and *superior* made the Vienna fragment more complex than originally thought. The results will be the subject of a separate article.

5 ʿAwwād, *Aqdam al-maḫṭūṭāt*, 32.

script traced in dark brown ink is close to early Abbasid style DI in Déroche's classification. The consonantal skeleton has been furnished with consonantal diacritic strokes in dark brown ink and vowel dots and orthoepic signs in red and green ink. The 147 leaves contain the text of the first two chapters of the Qurʾān, from the opening to verse 266 of *sūrah al-Baqarah*.

ʿAwwād specifies the meaning of the phenomenon of *raqq mabšūr* by turning to the English word 'palimpsest', which is defined as 'a parchment that has been previously used, from which then the writing disappeared and on which it is written a second time'. I was unable to verify the presence of any palimpsested leaf during my inspection of the manuscript at the Topkapı Sarayı.[6] A possible explanation could be the ambiguous use of the term palimpsest, which in this case refers to the condition of the ink on a few pages. Thus, for example, the script of f. 13r, reading Q.2:26 (from *inna llaha lā yastaḥyī* to *wa-ʾammā llaḏīna kafarū*) is effaced and a few letters are totally illegible, probably because of the deterioration of the ink. At a later stage, the faded illegible script was partially retraced in black ink in an unsystematic and imprecise way, thus producing a) the outline of empty letters, b) partially filled letters (e.g. only the round head of final *qāf* without retracing its tail) and c) misleading filling, such as *fāʾ* and *lām* joined by a long horizontal line in *fa-yaʿlamūna*, thus leaving the other faded letters and providing a misleading aid to properly reading the word. Except for f. 13r and further leaves that show similar characteristics of retracing of effaced script (*jandara* technique), to the naked eye there was no trace of a possible palimpsest in the sense of the reuse and reallocation of a written object.[7]

In the palimpsesting process, the reuse and transformation of the text as well as the object is an essential characteristic of the artefact defined as a palimpsest, while in situations such as a) erasing to correct parts of a text or b) crossing out text by writing a new text above the crossed out parts, as well as c) retracing faded writing, the object—be it a quire, a group of quires or single leaves—keeps its original codicological structure and content, despite the later changes and intervention. The *emendatio*—whether proposed by the copyist or by a later reader—remains an *emendatio* to the original manuscript, whereas the palimpsesting process—in its proper technical meaning—involves the production of a new object using previously written materials.

Palimpsesting is—to some extent—related to the *Genizah*-like practice, since they are both ways of dealing with worn-out or discarded leaves and fragments of texts, and in particular of sacred texts. Disposal of such objects may include washing and erasure, as well as laying aside in a well-protected chamber.[8] The genizah is a deposit of several manuscripts piled in one place, while in the palimpsesting dynamic, two (or more) manuscript texts are stacked together. Both practices have produced deposits of objects and texts, sometimes in a multicultural and multilinguistic environment.

2. HISTORY OF QURʾĀNIC PALIMPSEST MANUSCRIPT STUDIES

The founder of manuscript studies, Bernard de Montfaucon (1655–1741), is regarded as having introduced awareness of the phenomenon of palimpsests in the Latin and Greek West in his works at the beginning of the 18th century. In Qurʾānic studies, however, the rare examples of a palimpsesting process for the reuse or production of Qurʾānic manuscripts and—more broadly—manuscripts in Arabic script, never led to a proper field of research into Qurʾānic palimpsests.

Removing the ink from manuscripts is a known procedure described in Islamic sources. Thus, recipes for obtaining a new white surface in order to reuse parchment leaves are described in *Zīnat al-katabah* ('The Ornament of the Scribes') by al-Rāzī (d. 925) and in *ʿUmdat al-kuttāb wa-ʿuddat dhawī al-albāb* ('The Staff of the Scribes and the Implement of the discerning') by al-Muʿizz Ibn Bādīs (d. 1062).[9] Concise descriptions of what

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[6] I am very grateful to the director of the Topkapı Sarayı Museum Library for the kind permission to consult the manuscript, and to all the staff for their generous help. This enabled me to verify the exact meaning of the description given in ʿAwwād, *Aqdam al-maḫṭūṭāt*.

[7] See Hilali, *Sanaa Palimpsest,* 11–12 on the *jandara* technique, i.e. the rewriting of a text by filling the parts of the script which are blank because of faded ink. This indicates an act of retracing, passing the pen over the parts of the writing that have disappeared.

[8] Cohen, Geniza for Islamicists, 136–137, referring to Sadan, Genizah.

[9] On the work of the physician and chemist Abū Bakr Muḥammad ibn Zakarīyā al-Rāzī, *Zīnat al-Katabah*, in which there are nine recipes for removing ink traces from writing surfaces and for the reuse of parchment (*tirṣ* or *tils*), see Zaki, Early Arabic Bookmaking. The text of Ibn Bādīs has been translated in Levey, Mediaeval Arabic Bookmaking and Chemistry, 36–37 (ninth chapter, on the work in which writing is eradicated from manuscripts and parchment, from paper and bound books). See Zaki, Early Arabic

the Islamic historical sources report on the process of manuscript production as regards erasing and soaking have been outlined, for example, in the 2000 (and 2007) handbook edited by Déroche, Tuerlinckx' 2009 article focused on Arabic palimpsests, and Hilali's 2017 work on the Ṣanʿāʾ palimpsest.[10]

As regards awareness of the existence of palimpsested leaves or manuscripts, individual aspects of palimpsesting are quoted in the Islamic sources with reference to the standardisation of the ʿUthmānic text, which record situations such as, for example, ''ʿAbd Allah b. ʿUmar washed Ḥafṣa's leaves with insistence'[11] or 'Thus Muhammad ibn Ishaq [al-Nadim] said: I have seen a number of Qurʾānic manuscripts, which the transcribers recorded as manuscripts of Ibn Masʿūd. No two of the Qurʾānic copies were in agreement and most of them were on badly effaced parchment'.[12] The mention of the reuse of non-Qurʾānic books (e.g. Jewish and Christian scriptures) by washing off their text in order to write the Qurʾānic text is in the *Kitāb al-Maṣāḥif* by Ibn Abī Dāʾūd al-Sijistānī (d. 928).[13]

The discovery and study of Qurʾānic texts in the *scriptio inferior* of *codices rescripti* and the reuse of Christian scriptures for writing the Qurʾānic text began at the end of the 19th century and beginning of the twentieth. The first Qurʾānic palimpsested manuscript to generate great interest was undoubtedly the so-called Mingana-Lewis palimpsest, a Sinai *codex rescriptus*. The main body of the object was purchased by Agnes Smith Lewis in 1895, and partially edited and studied in 1902. Later, the owner and Alphonse Mingana published a more complete edition of the Qurʾānic leaves used for making six new small quires of the *codex rescriptus* of Christian Arabic homilies. In 1930, Alberto Vaccari observed that a Beuron palimpsest fragment with the Greek text of Genesis on its *scriptio inferior* was part of the Lewis codex. However, the Lewis codex disappeared from 1914 to 1936 after the owner sent it to Leipzig for the 1914 International Book Exhibition, a few days before the outbreak of the First World War. Cambridge University Library inherited the manuscript—bought by Smith Lewis—in 1936, but the two-decade period for which it disappeared created the common impression that the manuscript was lost or destroyed forever.[14] In 2005, I traced the 'lost palimpsest' in Cambridge and disseminated knowledge about its story in an initial article.[15] Later, in 2011, I identified a further half-leaf in Birmingham belonging to the twelfth (according to the written Greek numerals) quire of the *codex rescriptus* as being a Qurʾānic leaf, whereas the catalogue of the Birmingham collection described it as an unknown Christian text.[16] In 2015, the story of the entire object was reconstructed, the Birmingham part being connected with Tischendorf's travels to Sinai, and the disappearance of the Cambridge codex during the Leipzig period being also connected with Tischendorf, as well as other German scholars.[17] In 2018, on the occasion of the conference "New Light on Old Manuscripts: Recent Advances in Palimpsest Studies", I could suggest—thanks to a serendipitous meeting with, and the great kindness of, Bernard Outtier—that the eleven leaves mentioned in the Assfalg-Molitor catalogue of Armenian manuscripts were the last leaves and quires of

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Bookmaking, 224, on the attribution of the work to Ibn Bādīs. The technical treatises and their recipes for removing the ink so that no remnants can be seen are described in great detail in Fani, *Le arti del libro*, 45–48 (recipes no. XI, XII, XX, and XXI in al- Rāzī) and Fani, Arabic Manuals on Ink Making, 442–443, 450–451.

10 Déroche, *Islamic Codicology*, 43–45; Tuerlinckx, Palimpsestes à écriture supérieure arabe, 187–188 and the section on 'Palimpsesting techniques' in Hilali, *Sanaa Palimpsest*, 7–13. See also Fedeli, Digitization Project, 104–105. See also the recommendation of Mālik ibn Anas regarding the effacement of the text of a deteriorated *muṣḥaf* if the material surface is still usable (Jahdani, Du *fiqh* à la codicologie, 277).

11 Reported in Hilali, *Sanaa Palimpsest*, 8.

12 Reported in al-Nadīm, *Fihrist*, 57, and see also *ibid*., 8: 'For a number of years the people of Baghdād wrote on erased sheets. The registers spoiled at the time of Muḥammad ibn Zubaydah were parchments, which after being erased were once more written upon'.

13 See Gacek, Copying and Handling of Qurʾāns, 246.

14 MS Cambridge University Library, Or. 1287. To my knowledge, before the 2005 article (Fedeli, Mingana and the manuscript of Mrs. Agnes Smith Lewis), the location of the Lewis palimpsest was not mentioned in any works on Qurʾānic manuscript studies. Thus, scholars in Qurʾānic manuscript studies supposed the Qurʾānic leaves to be in a private collection in Great Britain, while the Greek fragment was known to scholars in Greek manuscript studies, see Tchernetska, Greek-Oriental Palimpsests, 252.

15 Fedeli, Mingana and the manuscript of Mrs. Agnes Smith Lewis.

16 Fedeli, Digitization Project.

17 The identification of scattered leaves and the story of Tischendorf's involvement in the history of the codex's whereabouts after it left Sinai are in Fedeli, *Early Qurʾānic Manuscripts*, 76–82, and Fedeli, Manuscript Acquisitions. Further work has been done by George, who mainly focused only on the palaeographical aspects of the Qurʾānic leaves of the Cambridge manuscript and the multicultural context in which it was assembled, see George, Palimpseste Lewis-Mingana de Cambridge.

the codex of Christian homilies bought by Smith Lewis.[18] In 2016, the scholarly digital edition of the Qurʾānic leaves, with extensive annotations and the hypothetical retracement of the *scriptio inferior* of the codex of Homilies, was published in the Cambridge Digital Library.

Roughly in the same period in which Agnes Smith Lewis noticed that there were some Qurʾānic leaves among the materials reused for manufacturing the codex that she purchased in Suez, the Academy of Sciences in Berlin charged Bruno Violet and Hermann von Soden with the task of exploring the Christian manuscripts of Damascus. In 1900, the two scholars obtained permission to inspect some treasures from the Qubbat al-Ḫazna in the courtyard of the Umayyad Mosque in Damascus.[19] In 1903, von Soden informed the Academy of Sciences about the first survey of the content of the deposit of the mosque, which included some palimpsest leaves.[20] From 1902 to 1908, the Damascus collection studied by Violet and von Soden was sent to Berlin and a very small but representative sample of 54 fragments were photographed before the request—and decision—to return them to Damascus. The photographic album of the Damascus fragments collected in 1908 and now deposited at the Staatsbibliothek in Berlin includes a single Qurʾānic leaf (3r and 4r) written on top of a Greek fragment of the Book of Esther in majuscule script.[21] However, the album does not make any reference to the content of the photographed manuscripts. The content of leaves 3r and 4r was noticed and briefly described by Violet in 1905, and then by Kurt Treu in 1966.[22] In the same year, Robert Hanhart published his edition of the Book of Esther and included the Damascus palimpsest among the manuscripts he used. It was Hanhart who rediscovered the album in the archives of Marburg and gave it to Treu. Thus, the album went from Marburg to Berlin around that period, in 1965/1966.[23]

Later works referred to the content of the fragment on the basis of the 1900 German mission and 1908 photographic album,[24] as the location of all of the Damascus fragments that should have been returned to Damascus in 1909 has been unknown since they left Berlin.[25]

In that period of feverish travel activity and trade in manuscripts at the beginning of the last century, another Sinai *codex rescriptus* created by the reuse of several materials in different languages, scripts, and cultures, including Arabic script, entered the Ambrosiana Library. In 1910, the library's prefetto, Achille Ratti (later pope Pio XI), acquired a Sinai *codex rescriptus* from the Rosenthals Antiquariat in Munich. From the 1920s, the Latin and Greek elements of the Ambrosiana codex of the *Apophthegmata Patrum* were known to the scholarly community[26], and its *scriptio superior* was studied by Sauget in 1989,[27] but only in 2000 did a larger project also include the study of the Hebrew and Qurʾānic leaves of the *scriptio inferior*. In fact, among the recycled materials, two Qurʾānic leaves are used to form the twelfth quire of the small codex. François Déroche studied

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[18] See details in fn. 69.

[19] See D'Ottone Rambach *et al.* (eds.), *Damascus Fragments*.

[20] 'Biblische Fragmente. a) Septuaginta. Ein Blatt aus S. V., griechische Majuskel mit darübergeschriebenem Kufi' probably refers to the bifolio here described. See von Soden, Bericht über die Handschriftenfragmente, 829.

[21] Staatsbibliothek zu Berlin – Preußischer Kulturbesitz, Mss. simulata orientalia 6: Photographien von ausgewählten Fragmenten aus der Omayyaden-Moschee in Damaskus in verschiedenen Sprachen, 1908, 58 ff. Photographs of selected fragments from the Umayyad Mosque in Damascus in different languages. See also Vollandt, The Qubba and the Arabic Bible, 182 fn. 5.

[22] Kurt Treu presented his lecture on the Septuagint fragments from Damascus at the Göttingen Academy in 1965, and the work was published in 1966. Treu thanked his colleague Gotthard Strohmaier for his kind help in reading the *scriptio superior* of the fragment, see Treu, Majuskelbruchstücke der Septuaginta aus Damaskus, 204 fn. 3. He added the reference to Violet as regards the content, i.e. 'Kufi, Koran' (*ibid.*, 210).

[23] See Treu, Majuskelbruchstücke der Septuaginta aus Damaskus, 203 fn. 4 and Hanhart, *Esther*, 11–12. The information reported by Treu and Hanhart regarding the return of the album from Marburg to Berlin in 1965–1966 partially contradicts the supposed loss of the album during the Second World War and the fact that it 'resurfaced at the Staatsbibliothek in Berlin in 1999' (Vollandt, *Muslim Genizah in Damascus*, note 2).

[24] See Radiciotti and D'Ottone, I frammenti della Qubbaᵗ al-Ḫazna, 51–52. The Italian article was later translated and modified in English, see D'Ottone, Manuscripts as Mirrors. In the 2008 article, Radiciotti reported a short description of the palimpsest leaf on the basis of the 1966 article by Treu.

[25] 'Seitdem [i.e. 1909] ist der Aufenthalt der Stücke unbekannt', in Treu, Majuskelbruchstücke der Septuaginta aus Damaskus, 203 fn. 4 and 'Die Originale sind seither verschollen, doch besitzt die Kommission für spätantike Religionsgeschichte der Deutschen Akademie der Wissenschaften zu Berlin Violets Photographien (Akz. Nr. 481) zusammen mit seinen Notizen (Akz. Nr. 484)', in Hanhart, *Esther*, 11–12 (MS no. 822).

[26] Giovanni Galbiati published his article on Virgil's fragment in 1927, see Galbiati, Vergilius latine et græce.

[27] Sauget, Paterikon arabe.

the two Qurʾānic leaves and his description was reported in the joint publication of 2008 published by Colette Sirat.[28] In 2015 and 2019, I had access to the two Qurʾānic leaves on the premises of the Ambrosiana Library, and my preliminary conclusions are published in this article.[29] Recently, in 2020, I located the second missing quire of the *Apophthegmata Patrum* of Ambrosiana *codex rescriptus* L 120 sup.[30]

Among the three Qurʾānic palimpsests acquired or accessed in the period between 1895 and 1910, only the Sinai palimpsest acquired by Smith Lewis was thoroughly studied (within the limits of the technical means available at the time) and widely publicised, although the vicissitudes of its journey led to its being considered lost, stolen, destroyed, or even a fake artefact.

About sixty years later, in July 1973, during restoration work at the Great Mosque of Ṣanʿāʾ, a large number of Qurʾānic leaves were discovered in the false ceiling of the building. Among them was an early Qurʾānic manuscript written on top of another early Qurʾānic manuscript. The Italian architect Paolo Costa was the first scholar to communicate to the academic community the news of 'a large deposit of old codices, mainly dismembered, that are piled between the roof and the ceiling'.[31] Among the 'crumpled' leaves that had been discovered, Costa noticed some religious texts, mainly Qurʾānic copies, and interpreted the storing of those manuscripts as a *genizah* practice.[32] A large number of the 15,000 fragments were initially restored, grouped, identified, and classified by a German team of conservators and scholars.[33] Initially, the manuscripts were housed in a side room of the library of the Great Mosque, and the first laboratory was established at the Dār al-Kutub.[34] The manuscripts were then kept in Dār al-Maḫṭūṭāt. The Ṣanʿāʾ Qurʾānic palimpsest (MS DaM 01-27.1, from now on DaM palimpsest) was part of an exhibition held in Kuwait in 1985, as well as the UNESCO 'Memory of the World' project in 1996, and has been the subject of several articles by Gerd Puin, but it achieved the apogee of its fame, reaching the non-academic public, in an article published in *The Atlantic* by Toby Lester in 1999.[35]

From 2008 onward, Elisabeth Puin analysed the DaM palimpsest by means of microfilm made by the German scholars, and recently, following the special imaging executed in 2007 in situ at Dār al-Maḫṭūṭāt,[36] the

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[28] Sirat *et al.*, Vingt manuscrits.

[29] I thank the director of the Biblioteca Ambrosiana, Federico Gallo, for his trust in granting me special permission to see the Qurʾānic leaves, since consultation of MS L 120 sup. is not permitted because of its fragile condition. I inspected the original manuscript with my naked eye without the help of any technical tools or digital images which would be a valuable instrument in retracing the *scriptio inferior* in palimpsests based on a kinaesthetic/palaeographic feedback loop methodology. See Fedeli, *Early Qurʾānic Manuscripts*, 94–95.

[30] This recent identification will be the subject of a separate work. The quaternion that I recognized contains the text that corresponds to the section in MS Strasbourg, Bibliothèque nationale et universitaire 4225, f. 63v, l. 7, and runs almost parallel to the Strasbourg text, the last line corresponding to MS Strasbourg 4225, f. 66v, l. 10. See also Grigory Kessel's note on MS Strasbourg 4225 in his contribution in this book.

[31] Costa, Moschea Grande di Ṣanʿāʾ, 505–506. As regards the manuscripts found in July 1973, see also Canova, The Great Mosque of Ṣanʿāʾ, mentioning Paolo Costa's article on Problems of Style and Iconography in the South-Arabian Sculpture.

[32] Costa, Moschea Grande di Ṣanʿāʾ, 506, 'Esso [the depository used for the manuscript material] risale evidentemente a un restauro della moschea durante il quale fu fatto un riordino della biblioteca. E' probabile che i volumi in cattivo stato di conservazione siano stati in tale occasione rimossi e, per rispetto, non distrutti, ma occultati nel sottotetto'.

[33] Thomas Eich is tracing the details of the conservation projects planned and executed after the discovery of the manuscripts in the 1970s. Some of his results are published in Eich, Projekt zur Restaurierung von Handschriften.

[34] See the details of the first stages of the restoration project in Böhrenz and Bartelt, Einrichtung einer Buch- und Handschriftenrestaurierungswerkstatt. I thank Thomas Eich for his kindness in bringing this reference to my attention.

[35] See Lester, What is the Koran?

[36] It must be noted that the comparison between the Damascus manuscripts brought to Germany and the Ṣanʿāʾ palimpsest brought to Italy, as it is described in D'Ottone, Frammenti di manoscritti arabi, 261–287, 277 fn. 74, is probably a misunderstanding, as the Ṣanʿāʾ palimpsest was never brought to Italy and the imaging was done *in situ* on the premises of Dār al-Maḫṭūṭāt—under my direct supervision—in October 2007. The imaging was executed with the funds of the ANR Project 'De l'Antiquité tardive à l'Islam', in agreement with the Ferni Noja Noseda Foundation. Sergio Noja Noseda established personal contacts with Yemeni scholars and institutions from 2002 to 2007 in order to obtain Yemeni trust for executing the imaging of the palimpsest. Yemeni trust was gained through several efforts and not because of any Italian political support or money given to Yemeni people, as is often supposed. Thus, reports such as those published in al-Azami, *Ageless Qurʾan Timeless Text* do not give a complete picture of the story and are incorrect in some of the detail. Al-Azami wrote that in summer 2002 'Curiosity led me to thumb through his [i.e. Noja Noseda's] collection and I was startled at the sheer volume of high-quality images he had of precious Qurʾānic fragments from the treasure

palimpsest has been studied and edited by Behnam Sadeghi and Mohsen Goudarzi, Asma Hilali, and within the Corpus Coranicum project.[37] After the different editions published by Puin, Sadeghi-Goudarzi, and Hilali, further interpretations of the palimpsesting process and the nature of the fragments were proposed by François Déroche and Eléonore Cellard. The latter focuses on the codicological structure of the possible recycled manuscript, while the former interprets the recycled leaves—that were mainly used with the same disposition of recto/verso in both layers—as part of a *muṣḥaf*, rather than isolated leaves used in a teaching context, as proposed by Hilali.[38]

However, the collective memory of local people in Ṣanʿāʾ reported that there had been a previous discovery of manuscripts, known since the 1960s, before the discovery of the false ceiling—including a further large section of the Ṣanʿāʾ palimpsest—that remained unknown to the scholarly community until recently.[39] This further section of the Ṣanʿāʾ palimpsest consists of several quires that also show some bifolios and have remnants of sewing thread. This was kept at al-Maktaba al-Sharqiyya (from 1984, Maktaba al-Awqāf) located on the premises of the Great Mosque in Ṣanʿāʾ in an annexe constructed by order of the imam Ḥamīd al-Dīn (r. 1904–48).[40] The *scriptio superior* of this part of the palimpsest was studied by Razan Ghassan Hamdoun, who submitted her Master's thesis, *The Qurʾānic Manuscripts in Ṣanʿāʾ from the First Century Hijra and the Preservation of the Qurʾān* to al-Yemenia University in 2004.[41] In 2008, during a direct inspection of the object, displayed in a glass showcase at al-Maktaba al-Sharqiyya, I was able to conclude that the Ṣanʿāʾ palimpsest section was likely not restored in recent times and its good condition implies a different fate in comparison with the section discovered in the 1970s.[42] The leaves that appeared on the antiquarian market in the 1990s—and were subsequently displayed in museums and institutions—were leaves removed from the section of al-Maktaba al-Sharqiyya (from now on MaSh palimpsest).[43]

The *scriptio inferior* of the leaves of this section was never investigated until recently because only the low-resolution images published in the pdf version of Hamdoun's Master's thesis are available to scholars. Despite this limitation, a partial identification of the content of a small number of pages has recently been proposed. Some results are published in the next section of this article and will certainly be expanded and improved upon in the future.[44]

Among the manuscripts discovered in 2007 in a further deposit of discarded manuscripts inside the Great Mosque, I was able to identify and suggest the presence of a further piece of the puzzle. The mosque turned out to be a location for the *genizah* practice, not only in the space between the ceiling and the roof, but also in two niches covered by a wall on the west side of the mosque, near the wall of the minaret. The niches were discovered during restoration work on the wooden ceilings of the mosque carried out by a team headed by the Italian architect Renzo Ravagnan. Initial inspections were carried out in situ, in order to plan a project to

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trove in Ṣanʿāʾ, Yemen. He confided his secret, that his first audience upon reaching Ṣanʿāʾ had not been with the library director but with someone much higher up, the Italian ambassador' (*ibid.*, 3), likely confusing his personal memories of that event. In fact, Noja Noseda obtained the first high-resolution testing images of the Ṣanʿāʾ palimpsest in summer 2007, and the complete set in October 2007. The Yemeni Ministry of Culture gave permission for imaging and publishing the manuscripts to the Ferni Noja Noseda Foundation after five years of visits and discussions.

37 Sadeghi and Goudarzi, Ṣanʿāʾ 1 and the Origins; Puin, Früher Koranpalimpsest I, II, III, IV, and V; Hilali, *Sanaa Palimpsest*. Examples of retracement of the *scriptio inferior* by Hadiya Gurtmann within the Corpus Coranicum project of the Berlin-Brandenburg Academy of Sciences and Humanities have already been published on a number of occasions, e.g. Gurtmann, Qurʾan written over the Qurʾan and Déroche, *Coran, une histoire plurielle*, 206, 208, and 262.

38 See Cellard, Ṣanʿāʾ Palimpsest, and Déroche, *Coran, une histoire plurielle*, 209–213. On the different hypotheses in interpreting the Ṣanʿāʾ palimpsest, see D'Ottone, Frammenti di manoscritti arabi, 263–265.

39 See also Cellard, Ṣanʿāʾ Palimpsest, 4–5, regarding the discovery of fragments during a roof inspection of the Great Mosque in 1965.

40 See Schmidtke, Mosque Library in Yemen, 220–221.

41 Hamdoun, *al-Makhṭūṭāt al-Qurʾāniyya fī Ṣanʿāʾ*.

42 I owe to Marco Di Bella's kindness the viewing of the MaSh palimpsest.

43 See also a leaf which has recently resurfaced at the Louvre Abu Dhabi, as highlighted in social media. See Cellard, Ṣanʿāʾ Palimpsest, 7. These leaves, likely removed from their original items, underline the crucial importance of cataloguing all these new finds to establish their identity and certify their provenance.

44 Recently, since submission of this article, a further study of the MaSh section of the palimpsest has been published. Hythem Sidky has identified a number of words and passages in the *scriptio inferior* of some of the leaves, see Cellard, Ṣanʿāʾ Palimpsest, 14 and fig. 17. Sidky's reading partially overlaps with the results proposed in this article.

conserve, classify, and study the newly discovered manuscripts, and contacts were established with local authorities. This was initially successful, but the project has never been completed, since the war prevented its continuation. The total number of the manuscripts (quires, codices, and single leaves) was estimated at about 4,000 pieces, mainly on parchment and a few on paper. In 2008, over the course of about ten hours, I surveyed four metal boxes—each measuring about 70/80 × 30 × 40 cm—full of leaves, quires, and manuscripts. At the time of that inspection, the purpose was merely to assess the condition and content of the discovery in order to plan the future project. During the survey, I saw only Qurʾānic manuscripts, and noticed a palimpsest leaf that I compared with the Ṣanʿāʾ two-section palimpsest (DaM and MaSh).[45] A few observations about the unedited and uncatalogued leaf (from now on NF palimpsest leaf) are published in this article. Although the low resolution of the image I took does not allow the *scriptio inferior* of the parchment to be read, the discovery of this further piece and its location in the niche of the west side of the mosque can provide new elements in interpreting the Ṣanʿāʾ palimpsest.[46]

In addition to the well-known Ṣanʿāʾ palimpsest, among the manuscripts discovered in 1973 that were photographed as part of a UNESCO project, Elisabeth Puin and Keith Small noticed the presence of another Qurʾānic palimpsest, in their 2007 article, i.e. showcase 6, MS 18–?.a.[47] It is a single leaf of Qurʾānic text written on top of another Qurʾānic text.

Recently, palimpsest leaves of unknown provenance have appeared on the antiquarian market presenting a situation similar to the Damascus leaf, i.e. Christian materials recycled to write Qurʾānic text. In 2018, an auction house put into circulation some palimpsested leaves of the Qurʾān that were previously unknown to scholars. Before the auction, Eléonore Cellard recognized that the Qurʾānic leaves were written on recycled parchments containing a Coptic text. Unfortunately, the context of the leaves is unknown as the auction house did not provide any details about their provenance, which is assumed, on the basis of the content and script of the artefact, to be Egypt.

In the short history of discoveries and studies of Qurʾānic palimpsests that has been traced here, it is worth noting that the first studies on the Lewis palimpsest from Sinai influenced and still influence the field, and hence the understanding of Qurʾānic palimpsests as being pre-ʿUthmānic texts, meaning non-canonical texts that had to be destroyed. The assumption in this understanding of the palimpsests is that they provide indisputable evidence of intention to destroy a Qurʾānic manuscript because it is different from the consensus text of the ʿUthmānic recension. The sensationalist subtitle of the Mingana-Lewis edition, *Leaves From Three Ancient Qurâns; Possibly Pre-Othmanic*, was blown out of proportion by the enormous publicity for the book which was followed by strong reactions against Mingana's edition and introduction.[48] However, examples such as the Ambrosiana palimpsest Qurʾān from Sinai and the single leaf identified in the UNESCO CD, with their 9th/10th-century script of the Qurʾānic text, take us beyond this assumption that Qurʾāns were erased and cancelled because they were pre-ʿUthmānic.

Almost a century later, Lester's *Atlantic* article also contributed to reinforcing this narrow and incomplete perspective on Qurʾānic palimpsests, as traces of a *scriptio inferior* to be cancelled or hidden. In interpreting palimpsests, scholars should not single out the *scriptio inferior* alone as the unique object of their interest. Instead, a palimpsested manuscript is an artefact that is stratified and hence more complex. Palimpsests are repositories of languages, scripts, and cultures in contact, and should be explored as such.[49]

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[45] During the survey, I wrote just a few notes on the special paper used to individually wrap some of the interesting artefacts selected for the first step of the planned project.

[46] The images I took are sized to 2136 × 2848 pixels at 314 ppi.

[47] Small and Puin, UNESCO CD of Ṣanʿāʾ Mss 59–71, 60 and 64.

[48] See Fedeli, *Early Qurʾānic Manuscripts*, 310–318, on the criticism against Mingana considered as the only editor and author of the 1914 publication. Thus, for example, according to Muslim scholars, Mingana was 'not free from religious bigotry and prejudice' (quoted in *ibid.*, 312).

[49] See also the contribution of Claudia Rapp in this volume.

3. Qurʾānic palimpsests: they are rare, to our knowledge

The main factor could be the date. In the year 692, when, in Constantinople, the Christian Church prohibited the destruction of holy books by formulating a specific canon at the Council in Trullo (i.e. the *Concilium Quinisextum*), referring to and dealing with a centuries-old practice in the production of books, the situation was rather different in the young empire of the Caliphate under the Umayyad dynasty, where the production of copies of their sacred text was a recent practice, less than a century old.[50] The inevitable result is the relatively meagre number of existing Qurʾānic palimpsests, understanding this term to mean 1) Qurʾānic texts reused to write other kinds of text, 2) Qurʾānic texts reused to write the Qurʾānic text again, and 3) Qurʾānic texts written on top of non-Qurʾānic texts. This number will probably increase in the next few years because of new technologies in imaging manuscripts and new finds, but as things currently stand, the number of Qurʾānic palimpsests can be counted on the fingers of two hands.[51] Moreover, the materials are also a factor. As palimpsesting concerns papyrus and—to a greater extent—parchment, the introduction of paper into the Muslim production of manuscripts is regarded as one possible reason for the small number of Qurʾānic and, more generally, Arabic palimpsests.[52]

According to Cavallo, in Antiquity, in Latin and Greek culture, the use of palimpsested writing surface was common in writing texts for daily use and documentary texts, but such materials were rarely used for assembling an entire codex,[53] while—as mentioned above—the use of palimpsested parchments for writing the Qurʾānic text is a phenomenon repeatedly observed in the Islamic tradition. An example of a document relating to daily life in the Caliphate empire is a commercial letter written in Arabic in the 8th century on the verso of a strip of a parchment, measuring 30 × 9/11 cm that has the remains of a larger parchment leaf with a Biblical text, namely the Latin version of Exodus 8:16–20 and 8:28–9:1.[54]

3.1. The Unique Qurʾānic Palimpsest on Papyrus

As regards their materiality, palimpsests are commonly associated with parchment, although there are several examples of palimpsests on papyrus.[55] To my knowledge, the only example of a Qurʾānic palimpsest on papyrus is a strip from an Arabic protocol reused for writing some Qurʾānic texts arranged in a bifolio layout. The papyrus, P.Ming. 107 (IX.9), has physical signs of having been used as a talisman, folded many times to obtain a small square. The *scriptio superior* has an amalgam of Qurʾānic texts, i.e. Q. 3:7–11, Q. 112 and Q. 113 on the verso of the papyrus and Q. 100, Q. 3:11–13 followed by Q. 59:1 on the recto. The remnants of the *scriptio inferior* are likely part of an original *bi-smi -llāhi l-raḥmāni l-raḥīm* (‘In the Name of God, the Merciful, the Compassionate’), *lā ilāha illā llāh waḥdahu Muḥammadun rasūlu llahi* (‘There is no God but God alone, Muhammad is the Messenger of God’), and *amīr al-muʾminīna* (‘commander of the believers’) that refers to the official title of a caliph, since ʿUmar b. al-Khaṭṭāb adopted such a title on his election as caliph (634–644 CE).[56] The papyrus surface was reduced to a strip, thus cutting at least half of the original material, and was rewritten on both sides.

The Mingana Papyrus cannot be considered a palimpsest in the proper sense. In fact, the material was reused in its empty parts rather than being processed in order to obtain a new material surface, as the original writing was not cancelled. Nevertheless, the original object was destroyed and reallocated.

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[50] See Canon no. 68 of the Council in Trullo, which states that Old Testament and New Testament books are not to be destroyed or cut into small pieces, or given to book traders or those who prepare perfumes or ointments. See Ohme, *Concilivm Constantinopolitanvm*, 260–261. Cavallo comments on the βιβλιοκάπηλοι, mentioned in the canon of the Council, as ‘resellers of cleaned leaves whose first writing has been removed so that they can be used for a second writing’ (Cavallo, Immagine ritrovata, 10–11).

[51] A comparison with numbers of New Testament palimpsests can give an immediate idea of the striking disproportion between the two written traditions. A list of New Testament palimpsests compiled in 2009 reports about 250 palimpsests. See Welte, Griechischen Palimpseste, 30–52.

[52] See for example Sirat *et al.*, Vingt manuscrits, 146. The scholars explain the rapid spread of paper in the Muslim world as the reason for the very small number of Arabic palimpsests considered as both *scriptio superior* and *scriptio inferior*.

[53] Cavallo, Immagine ritrovata, 8.

[54] See Vaccari, Frammenti Biblici latini, 1–11, reported also in Grohmann, *Arabische Paläographie*, 109. Grohmann also mentioned a second example of an Arabic palimpsest in Coptic and Arabic, namely PER Inv. Perg. Ar. 220.

[55] See for example Schmidt, Palimpsestes littéraires grecs sur papyrus.

[56] See Fedeli, Isolated Qurʾānic Fragments, 184–190.

The known Qurʾānic palimpsests, i.e. palimpsested manuscripts with Qurʾānic passages either in the erased layer or in the *scriptio superior*, are listed and described in the following sections, focusing on the structure and layout of the two layers, considered as objects rather than merely *scriptio* (*superior* and *inferior*) in order to identify possible patterns in their productions according to their provenance (and scriptorium).[57]

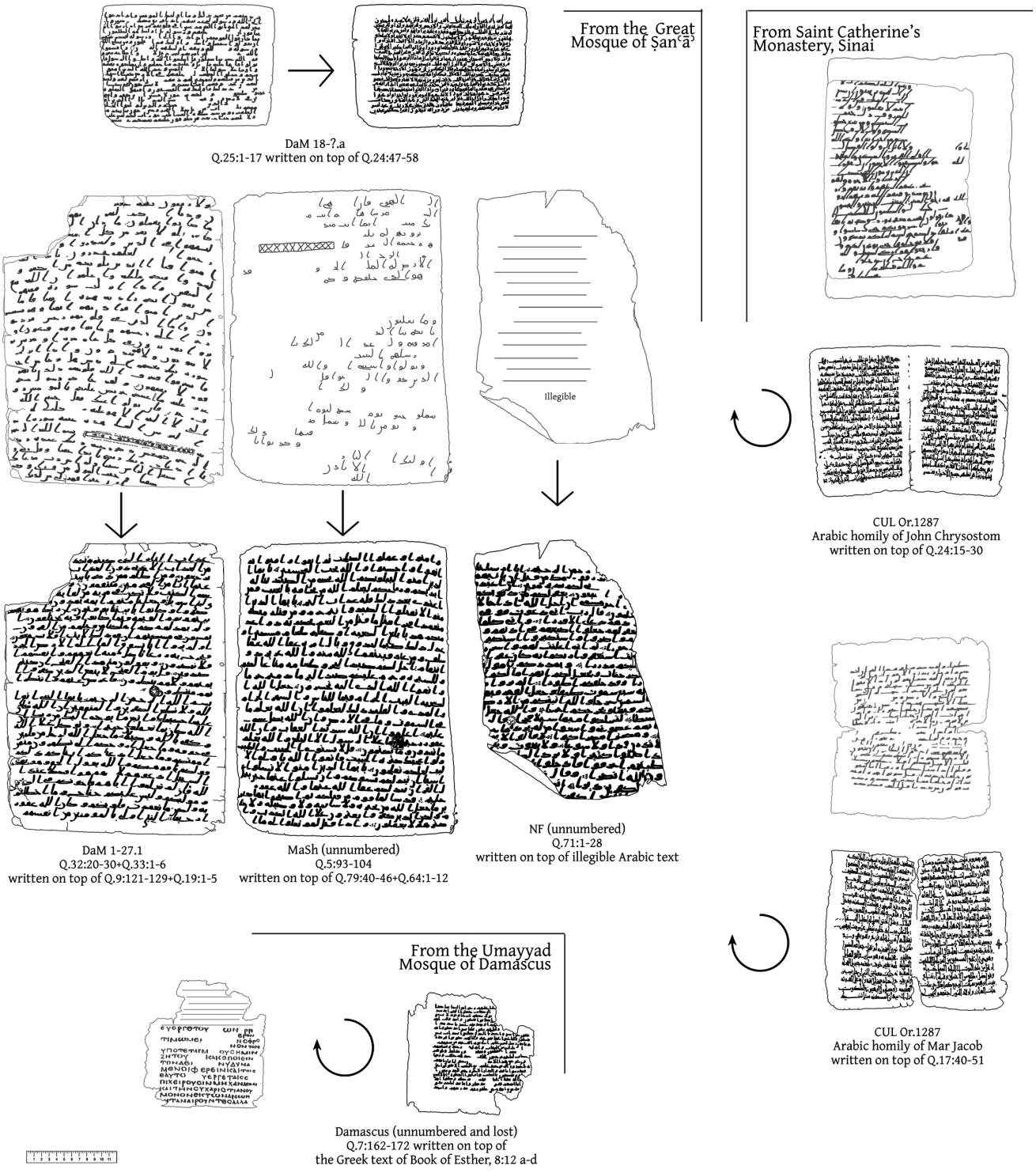

Fig. 1: Overview of the Qurʾānic palimpsests and their patterns
(© Alba Fedeli, 2019)

[57] See Figure 1 with a general overview of the Qurʾānic palimpsests and their patterns.

3.2. From Damascus

3.2.1. Damascus. Single leaf from the Qubbat al-Ḥazna

This is a single palimpsested Qurʾānic leaf that was manufactured using a recycled leaf of the Book of Esther in Greek. The current location of the leaf is unknown.[58]

Provenance and context. The single leaf brought to Berlin at the beginning of the 20th century was one of the manuscripts kept in the *genizah* of the Qubbat al-Ḥazna in the courtyard of the Umayyad Mosque in Damascus. This was a huge deposit of discarded Qurʾāns and materials in different languages and scripts from diverse cultures and traditions. Thus, the Damascus *genizah* stored Qurʾānic fragments, literary texts in Arabic and Turkish, texts in Latin, Greek, Armenian, Georgian, Coptic, Syriac, Aramaic, and French, dating from Late Antiquity to the Early Modern period.[59]

Structure. The palimpsest is a single leaf, without further connections to other known manuscripts, in both its *scriptio inferior* and *superior*.

Language and culture of the two layers. The *scriptio inferior* of the single leaf has part of the Book of Esther in majuscule Greek. It was reused to produce a Qurʾānic leaf.

Script style of the Qurʾānic text. The Qurʾānic text written on top of the Greek text of Esther has some features of the New Style Script, type III, according to Déroche's classification. Its main characteristic letter shape is final *alif* with its slight elongation below the base line. From the black and white image of the 1908 photographic album, diacritical strokes are not recognizable except in one instance, and no vowel signs are present. The script style is used in some dated manuscripts, thus placing the *scriptio superior* of the Damascus leaf possibly in the 9th/10th century.

Elapsed time between the two layers. The Greek text was probably written in the 5th century[60] and it was reused for writing a section of the Qurʾānic text about four centuries later.

Size and format of the two layers. The maximum dimensions of the leaf are 14 × 14.5 cm. The Qurʾānic text was written by turning the Greek leaf 90 degrees clockwise. Thus, the vertical format of the Greek leaf was adapted to the oblong format of the Qurʾānic leaf in the 9th/10th century. The recto (corresponding to 4r in the photo album, see Fig. 2) has Q.7:155–162, while the verso (corresponding to 3r in the photo album, see Fig. 3) has Q.7:162–172. The text is structured in 19 lines occupying a text area of 9.7 (complete) × 11.4 cm (lacunose). The margins measure about 2.5 cm at the bottom of the leaf, 1.5 cm at its top, and 3 cm in the outer margins.

In the 1908 photo album, the recto of the *scriptio inferior* is difficult to read, and the few unclear traces visible in its last lines are the reading of Esther 8:12 ([ἐν ἡμέρᾳ μιᾷ ἐν πάσῃ τῇ βασιλεί]ᾳ Ἀρταξέρξου, τῇ [τρισ]|[καιδεκάτῃ] τοῦ δω|[δεκάτου μην]ός, ὅς | [ἐστιν Ἀδάρ]).[61] Thus, the section of Biblical text in the verso of the leaf is Esther, 8:12 a–d, originally structured in 23 lines, of which ll. 1–3 are missing, ll. 4–10 are illegible due to the quality of the photo, and ll. 11–23 have the text of Esther 8:12c–d (from εὐεργετούντων to ἀνταναιροῦντες ἀλλὰ).[62] The missing writing material used to write ll.1–3 corresponds to the lacuna of the Arabic text, i.e. the outer margins of the leaf (i.e. left side of the recto and right side of the verso) according to the layout adopted for writing the Qurʾānic text. This means that the original recycled material of the Greek text was likely used in its entirety in the palimpsesting process of writing the Qurʾānic text, and the missing parts in both the Greek and Arabic text are a lacuna due to the wear and damage of the parchment rather than a trimming of the parchment in recycling the new object.

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[58] This leaf is also mentioned in the contribution of Ronny Vollandt in this volume. See D'Ottone Rambach *et al.* (eds.), *Damascus Fragments*, Introduction, 19–31 in particular, regarding the items that were lent to Berlin, photographed, and returned in 1909.

[59] See Radiciotti in Radiciotti and D'Ottone, I frammenti della Qubbaṭ al-Ḥazna, 45. See also the contribution of Ronny Vollandt in this volume and D'Ottone Rambach *et al.* (eds.), *Damascus Fragments*.

[60] Treu, Majuskelbruchstücke der Septuaginta aus Damaskus, 210 (on the basis of Violet), and von Soden, Bericht über die Handschriftenfragmente, 829. The dating to the 5th century is also reported in Radiciotti, see Radiciotti and D'Ottone, I frammenti della Qubbaṭ al-Ḥazna, 52.

[61] I thank Theodora Panella for her help in reading the *scriptio inferior* of the Damascus fragment.

[62] The text of ll. 4–10 is illegible on the available image (https://digital.staatsbibliothek-berlin.de/werkansicht?PPN=PPN685013049&PHYSID=PHYS_0007&DMDID=DMDLOG_0001, accessed 01.07.2023). See the edition of the Greek text in Treu, Majuskelbruchstücke der Septuaginta aus Damaskus, 210–211.

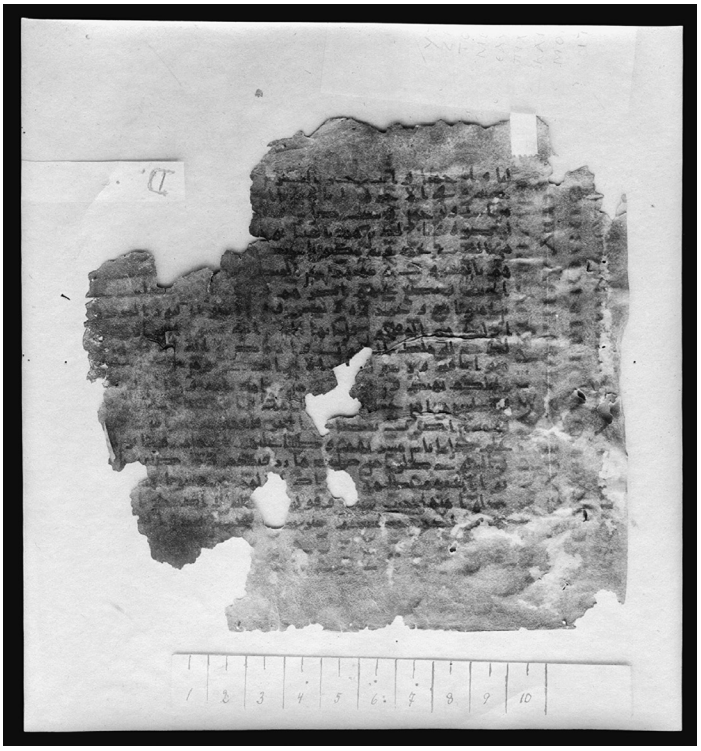

Fig. 2: Damascus palimpsest leaf (Qurʾān written over the Book of Esther in Greek)
Photo from the 1908 photographic album of fragments from the Umayyad Mosque
(© Staatsbibliothek zu Berlin - Preussischer Kulturbesitz, Orientabteilung, MSS. simulata orientalia 6, f. 4r
[recto of the single leaf, Q.7:155–162])

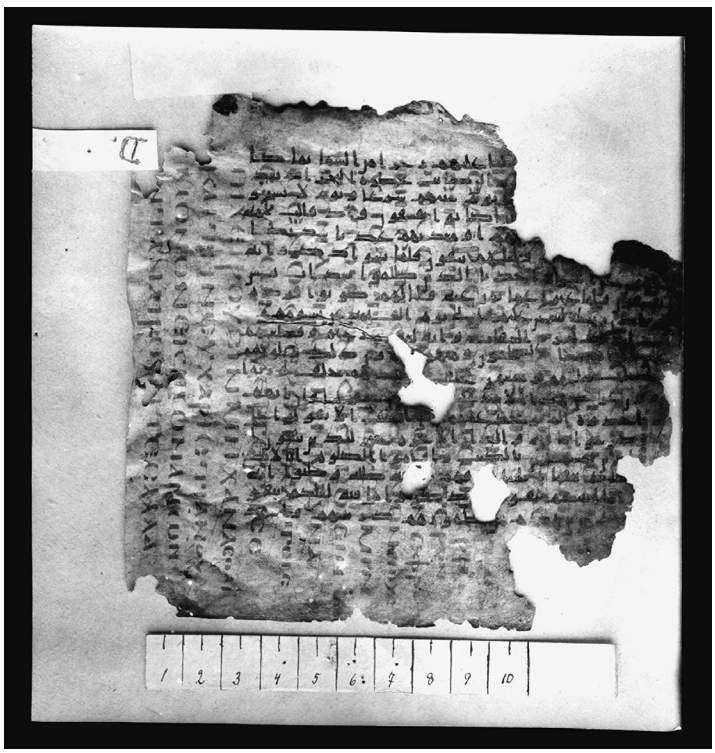

Fig. 3: Damascus palimpsest leaf (Qurʾān written over the Book of Esther in Greek)
Photo from the 1908 photographic album of fragments from the Umayyad Mosque
(© Staatsbibliothek zu Berlin - Preussischer Kulturbesitz, Orientabteilung, MSS. simulata orientalia 6, f. 3r
[verso of the single leaf, Q.7:162–172])

3.3. From Sinai

Two palimpsests manufactured in Sinai are known as having some Qurʾānic leaves among the composite recycled materials. The two codices are no longer in situ.

3.3.1. Cambridge University Library MS Or. 1287, Birmingham Mingana Christian Arabic Additional 150, 124 and 171, Erzabtei Beuron MS I and II

This is a Christian Arabic *codex rescriptus* from Sinai assembled by converting several leaves in different formats from diverse cultures, languages, and scripts, containing religious and documentary materials. Among the diverse materials are twenty-three leaves of parts of continuous portions of text from two distinct Qurʾānic manuscripts, respectively comprising sixteen and seven leaves, used to make the new small quires of the Christian codex.

Provenance and context. The manuscript of Christian Arabic homilies (*aqwāl*) belongs to the group of Sinai manuscripts which Tischendorf removed piece by piece from the library of the Monastery of St. Catherine in the 19th century. The larger section of the codex then became part of the antiquarian market in Egypt. The script of the homilies, together with their page layout and decorations, are characteristic of the Sinai tradition of writing anthologies of homilies, hagiographies, and hymns. Similar Sinai manuscripts are dated 868, 885, 897, and 901.[63] The Sinai provenance of the codex and its fragments is explicitly mentioned in the purchase documentation relating to the Mingana fragments and on the leaf that likely was added at the beginning of the *codex rescriptus* of the homilies.[64] Like the Ambrosiana MS L 120 sup., its mode of manufacture using recycled composite materials is illustrative of the multicultural and multilinguistic materials available in the environment of the Sinai monastery, where both palimpsests were probably assembled.

Structure. The *codex rescriptus* was produced and kept at St. Catherine's Monastery. Its known fragments are now scattered across three institutions, namely Cambridge University Library MS. Or. 1287 (162 ff. composed of 67 bifolios and 28 single small leaves), Birmingham MSS Mingana Christian Arabic Additional 150 (1 f.), 124 (2 ff. in one bifolio) and 171 (2 single leaves added at the beginning of the codex), and Beuron MS I, Erzabtei showcase 46 (1 f.) and Beuron MS II, no. 32 in the Catalogue of Armenian manuscripts (22 ff. made of ten bifolios and two single leaves, one of which was manufactured by trimming a bifolio).[65] In the mid-19th century, Tischendorf removed at least the three Birmingham fragments from the original codex. These ended up on the antiquarian market in the 20th century and were bought by Alphonse Mingana. The three fragments are catalogued as distinct entities, which I have recently connected. They are part of a larger group of Sinai fragments acquired by Mingana from Erik von Scherling in 1936. Beuron fragment I and likely also fragment II are part of a donation made by the collector Friedrich Grote to the monks because of their pioneering skills in photographing palimpsests, while the larger part of the codex was bought by Agnes Smith Lewis in Suez in 1895.

In Cambridge, the Lewis codex with its quires was disassembled and rebound according to the original order of the 94 recycled leaves and bifolios of the *scriptio inferior*. Each was mounted in cardboard and received new numbering. Recently, during the conservation process to remove the cardboard, which had forced and damaged the elasticity of the parchments during the course of the last century, the volume bound by Agnes Smith Lewis in 1914 was disassembled and now the original leaves and bifolios are kept in single folders. As regards the Birmingham fragments, these are kept in single folders. There has been no way of verifying the presence and condition of the leaves held at the Beuron Archabbey.

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[63] Lewis reported the opinions she received as personal communications from A. Cowley, Aldis Wright, and Ellis regarding the resemblance of the upper-writing of the Sinai palimpsest (then, Cambridge Or. 1287) with Vat. ar. 71, dated 885 CE (in Lewis, *Apocrypha Syriaca* ix-x). See also George, Palimpseste Lewis-Mingana de Cambridge, 406–410 (Sinai ar. NF Parch. 1, dated 868 CE; Strasbourg, Bibliothèque universitaire et nationale, Arabe 150, dated 901 CE and Arabe 151, dated 885 CE and Vat. ar. 71), and Fedeli, *Early Qurʾānic manuscripts*, 84 (Sin. ar. 72 dated 897 CE). George observes the similarity of the script in the codex of Arabic homilies and MS Mingana Chr. Ar. Add. 124, without suggesting that the two fragments were part of the same manuscript.

[64] See Fedeli, Digitization Project, 109, 117, and Fedeli, Manuscript Acquisitions, 229–232.

[65] The unnumbered manuscript from the Archabbey of Beuron is Manuscript no. 32 in Assfalg and Molitor, *Armenische Handschriften*, 114–116.

As mentioned above, among the diverse materials used to produce the *codex rescriptus*, twenty-three Qurʾānic bifolios belonging to two different objects (made of respectively sixteen and seven leaves) were reused to produce six quires originally numbered by the monks. Quires VI, XI, XII, XVII and XVIII are indicated with Greek alphabetic numerals.

Languages and cultures of the two layers. The composite recycled materials are the Syriac text of the *Protevangelium Jacobi* (or Infancy Gospel of James) and the *Transitus Mariae* (or Account of Mary's Passing) dating from the latter half of the 5th or beginning of the 6th century, the Peshitta (Gospels of Matthew and John) from the 5th/6th century, and a hymn from the 9th century; [66] the Greek text of Genesis[67] from the 7th/8th century;[68] the Armenian text of fragments from the Letter to the Hebrews, the Epistle to the Galatians, and the First and Second Epistle to the Corinthians, dated before the 9th century;[69] a Christian Arabic text in a script similar to the *scriptio superior* from the 9th/10th century; and the Arabic text of a few Muslim documentary materials from the 9th century.[70] Among the recycled materials used for assembling the new codex are sixteen small Qurʾānic leaves and seven larger Qurʾānic leaves.[71]

Script style of the Qurʾānic text. The script used for writing the small and large leaves of the Qurʾānic text is in *ḥijāzī* style from the 7th/8th century with 24 to 30 and 21 to 23 lines respectively, arranged in a vertical format.[72]

Elapsed time between the two layers. The codex of homilies written in Sinai in the 9th/10th century was produced using available recycled materials spanning a long period of time, from the 5th/6th century (the Syriac texts of the apocryphal Gospels and the Peshitta version of Matthew and John) to the 9th/10th century Christian Arabic text (placed in the same quire that includes three large Qurʾānic leaves), which is written in a script similar to the almost-contemporary text of the *scriptio superior*. As regards the Qurʾānic leaves, about two centuries elapsed between their production and the manufacturing of the Christian homilies in Arabic.

Thus, the person(s) who assembled the new object had at their disposal recycled composite materials in different formats expressing the multicultural and multilinguistic environment in which the codex of homilies was produced and used.[73]

Size and format of the two layers. The *codex rescriptus* consists of 190 extant small parchment leaves in vertical format, measuring about 20 × 12.7 cm.[74] The Arabic text of the homilies, arranged in a variable number of lines from fifteen to eighteen, is written in dark brown ink. Titles of homilies and their attribution

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[66] Texts edited in Lewis, *Apocrypha Syriaca*, 2–115 of the Syriac section (*Protevangelium Jacobi* and *Transitus Mariae*); 116–121 text of Isaiah and Exodus; 122–124 (and xxvi–vii) Hymn; 125–126 Mar Ephrem; 127–129 Miscellanea; 130 Mar Jacob; 131–132 Miscellanea. See also *ibid*., xii–xvii. As regards the Peshitta, see *ibid*., xxiii–xxiv.

[67] Lewis, *Apocrypha Syriaca,* xxi–xiii. On Beuron MS Erzabtei showcase 46, which bears a portion of Genesis 41 matching f. 11 of the Cambridge codex, see Vaccari, Palinsesti biblici di Beuron, 235.

[68] See Tchernetska, Greek-Oriental Palimpsests, 253–254, on the dating to the 7th to 8th century, while George reports a later dating (namely 8th/9th century) provisionally suggested by Guglielmo Cavallo, see George, Palimpseste Lewis-Mingana de Cambridge, 418.

[69] The Armenian text of the Mingana bifolio (Armenian version of Hebrews 11:15–23 and 24–32) was studied in Brock, Early Armenian Palimpsest. My hypothesis concerning the matching leaves of Beuron was initially based only on the information mentioned in Assfalg and Molitor, *Armenische Handschriften*, 114–116 and in their description in Graf, *Geschichte der christlichen arabischen Literatur*, 350–351. See Fedeli, *Early Qurʾānic manuscripts*, 87 and fn. 101. After my meeting with Bernard Outtier and his kindness in providing me with the images of the Beuron leaves, I was able to support my hypothesis with further evidence.

[70] On the dating of the materials, see George, Palimpseste Lewis-Mingana de Cambridge, 418–421.

[71] Lewis, *Apocrypha Syriaca*, xvii–xxi and xlix–lxviii and the later edition produced with Alphonse Mingana (Mingana and Lewis, *Leaves from Three Ancient Qurâns*). See Fedeli, *Early Qurʾānic Manuscripts*, 105–125, 276–330, and Fedeli, *Edition of MS CUL Or 1287*. This work is the first complete edition of the Qurʾānic leaves, since some leaves had not been identified in the 1902 and 1914 editions and, consequently, in later works.

[72] Fedeli, *Early Qurʾānic Manuscripts,* 105–125. George suggests a very early date for the large leaves, see George, Palimpseste Lewis-Mingana de Cambridge, 396–404. In 1996, Déroche was the first to classify the Qurʾānic palimpsest leaves as part of the corpus of manuscripts in *ḥijāzī* style, likely on the basis of the images reproduced in the 1902 and 1914 editions, as the location was unknown at that time (Déroche, Manuscrits du Coran en caractères higâzî, 14).

[73] Agnes Smith Lewis edited the texts of the *scriptio inferior* of the codex in 1902 (Lewis, *Apocrypha Syriaca*). See also the interesting observations about the environment in which the codex was manufactured in George, Palimpseste Lewis-Mingana de Cambridge, 413–416. The Armenian leaves are not included in the previous studies of the codex of homilies.

[74] As some leaves have been removed from the codex and exposed to damage over the course of time, some of the parchments are now smaller. It should be noted that one leaf is on paper (Lewis, *Apocrypha Syriaca* xii).

to a Church Father are marked in red ink and the separation between one homily and the next is indicated by simple coloured decorations.

The scattered fragments of the codex of homilies have all been kept as flat disconnected leaves, as some leaves were removed by Tischendorf and the supplier of Grote, and the rest of the codex was disassembled by Agnes Smith Lewis when she bought the codex and discovered that it was a palimpsest. The structure of the Lewis main section of the codex—as it was in 1895—is described in her 1902 publication, where she represented the 162 leaves structured in 21 quires, mainly quaternions, except quires I (two single leaves), II (a quaternion plus two single leaves) and XI (quinion),[75] whereas the extant Greek alphabetic numerals indicate quires V (corresponding to quire VII as indicated by Lewis) to XVIII (corresponding to quire XXI as indicated by Lewis). The actual order and structure of the quires as acquired by Lewis are likely to be different from the original order of the codex, according to the irregularities of the quire structure and the order of the homilies compared with the sequence given in MS Mingana Chr. Ar. Add. 171.[76] The eleven Armenian leaves from Beuron and the Birmingham Armenian fragment constitute the last three quaternions of the codex.[77]

The composite recycled materials have been used and adjusted to the small format of the codex. Thus, some leaves have been used without cutting or trimming, as in the case of the small Qurʾānic leaves (22 × 18 cm), whereas other leaves have been trimmed to reduce their measurements to the small leaves, such as the large Qurʾānic leaves. These now measure 24/25 × 18/19 cm, while originally they were about 31–32 × 23–24 cm. Thus, the manufacturing of the new codex caused more than one third of the original parchment surface to be trimmed off.[78] The small leaves maintained their whole area, as the generous margins suggest. Both the small and the large leaves were turned 90 degrees and folded to obtain bifolios for the small codex.

It is quite probable that the first layer of the Qurʾānic script was not visible at the time when the codex of homilies was manufactured, however it must be noted that the small Qurʾānic leaves were kept together to assemble complete quaternions corresponding to 1) ff. 13–20 (Q. 13:18–34 + Q.13:34–14:8 and Q.15:85–16:18 + Q.16:18–39); 2) ff. 53–60 (Q.7:143–158, Q.9:35–58, 16:78–96 + Q.16:96–116); 3) ff. 95–102 (continuous text from Q.16:117–17:9 + Q.17:9–30 + Q.17:30–51 + Q.17:51–69); 4) ff. 103–109+Mingana leaf (Q.7:158–174; Q.9:18–35; Q.9:59–78; Q.11:17–37). The large leaves were used to assemble the two last quires of the Cambridge Lewis section, namely the complete quaternion of ff. 147–154 (Q.19:76–20:40; Q.22:34–65; Q.40:78–41:21; Q.44:37–45:21) and three leaves of the quaternion of ff. 155–162 (Q.24:2–30; Q.28:29–52; Q.29:18–43). Therefore, it seems more plausible to think that the recycled materials were kept together even as 'new' material surfaces, rather than assuming that the cleaned recycled parchments were piled up in a random and disorderly fashion.

Moreover, it is logical to assume that the sections of the Qurʾānic text used as recycled materials did not start and finish abruptly, thus lacking the continuity and meaning of the completeness of the syntactical structure. Thus, the small and large leaves were probably part of two larger objects. However, there are no traces or elements which make it possible to deduce the original quire structure of the small and large extant leaves.

3.3.2. Biblioteca Ambrosiana, MS L 120 sup.

This is a Christian Arabic *codex rescriptus* from Sinai that reuses several leaves in different formats from diverse cultures, languages, and scripts, from both religious and classical traditions. Among the diverse reused materials are two single leaves of Qurʾānic text.

Provenance and context. Manuscript L 120 sup. is one of a number of Christian Arabic manuscripts datable from around the 10th/11th century or the 11th/12th century, purchased by Achille Ratti from Rosenthals

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[75] Quires XIII and XIV are two quaternions, now that the Birmingham half leaf of the Qurʾānic text has been interpreted as joined to f. 103 of the Lewis Cambridge palimpsest. See the observation about the irregularity in the quire structure in Smith Lewis, *Apocrypha Syriaca*, xi–xii, reported also in George, Palimpseste Lewis-Mingana de Cambridge, 411 fn. 75 without observing the different interpretation of the quire structure following the discovery of the Birmingham half leaf.

[76] See Fedeli, *Early Qurʾānic Manuscripts*, 88–91.

[77] Ff. 9v and 8v of the Beuron leaves have alphabetic Greek numerals indicating respectively 19 and 20. The Beuron Armenian quire 19 follows the last quire of the Cambridge manuscript, marked as quire 18.

[78] Fedeli, *Early Qurʾānic manuscripts*, 120–121.

Antiquariat in Munich in 1910.[79] The *codex rescriptus* is a *Paterikon* that contains the Arabic version of a collection of *Apophthegmata Patrum* in the first part and a composite collection of *Apophthegmata*, anecdotes, and edifying stories in the second.[80] The Arabic script of the new codex is similar to other manuscripts produced in the scriptorium of the Monastery of St. Catherine. The process of its manufacture, putting together several recycled leaves in different scripts, languages, and cultures, is similar to the construction of the *codex rescriptus* Sinaiticus described in the previous section (3.3.1).

Structure. The original *codex rescriptus* was disassembled when it entered the Ambrosiana, and it now consists of flat leaves kept in single cardboard folders grouped in a further folder, quire by quire. Two Qurʾānic leaves have been reused to produce ff. 86 and 91 in the twelfth quire of the *codex rescriptus*.[81]

Languages and cultures of the two layers. The *codex rescriptus* L 120 sup. is a Christian Arabic text, i.e. a *Paterikon* that was assembled in the 10th to 12th century by reusing several texts in different scripts and languages: Hebrew, Greek, Greek with Arabic, Latin with Greek, and Arabic.[82]

The new codex contains 524 elements from composite texts. Sauget defined it as 'un Paterikon arabe mixte'.[83] The first part, comprising elements no. 1–436, corresponds to a systematic collection of the *Apophthegmata Patrum* with a few characteristics that suggest a connection with the Syriac text of the *Paradisum Patrum* by the monk Ananisho (*ʿAnān-Īshōʿ*). Moreover, some features of the Arabic version in translating proper names reveals 'l'influence incontestable du syriaque'.[84] The second part, comprising elements nos. 437–524, is an amalgam of heterogeneous pieces from the *Apophthegmata Patrum*, the *Pratum spirituale* of John Moschus, the *Narrationes* of Anastasius of Sinai, the *Historia Lausica* of Palladius, and ascetic writings and lives of saints.[85]

The majority of these recycled leaves (90 ff. out of 140) belonged to six Arabic manuscripts, of which only the two Qurʾānic leaves have been identified.[86] Moreover, there are eleven manuscripts of the Hebrew Bible (28 ff. of the *codex rescriptus*), including fragments of Numbers, Deuteronomy, Joshua, Samuel, Kings, Chronicles, and Proverbs, dated from the 10th–11th century;[87] one manuscript (2 ff.) of the Siddur with the prayers written in Hebrew and the liturgical prescriptions in Arabic language and Hebrew script from the 10th-11th century; one manuscript of Virgil's Aeneid in Latin with Greek translation (8 ff.) from the 4th–6th century;[88] one Greek manuscript of a tractate of John's Gospel (2 ff.) from the 9th century;[89] and one Septuagint manuscript (Habakkuk and Daniel) with translation into Arabic (4 ff.), from the 9th century.[90] Excluding the 96 leaves

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79 Sauget suggested the 10th/11th century (Sauget, Paterikon arabe 474) while Sirat reports the 11th/12th century (Sirat *et al.*, Vingt manuscrits, 145).

80 Sauget, Paterikon arabe.

81 The Qurʾānic leaves are indicated as corresponding to ff. 91–92 of the 11th quire of the *Paterikon* in the text of the article by Sirat, although the list reports correctly ff. 91:86 of the 12th quire as having Qurʾānic text on their *scriptio inferior* (Sirat *et al.*, Vingt manuscrits, 147). To manufacture the 12th quire, in addition to the two small Qurʾānic leaves, two large Arabic leaves in vertical format and one large leaf with fragmentary Hebrew text of II Samuel, 15: 14–29 have been used. The former have been kept in their entire size while the Hebrew fragment has been cut horizontally in two and only the upper half of the original leaf has been used in the extant part of the *codex rescriptus*. The upper part of the Hebrew leaf is now divided into two small leaves.

82 Löfgren and Traini, *Catalogue of the Arabic Manuscripts*, 18–19, no. XIX (L 120 sup., formerly S.P.II.161); Sirat *et al.*, Vingt manuscrits, 145; Fressura, I perduti ff della Biblioteca Ambrosiana, 241–242.

83 Sauget, Paterikon arabe, 474.

84 Sauget, Paterikon arabe, 494.

85 Sauget, Paterikon arabe, 473, 501–508.

86 Sirat *et al.*, Vingt manuscrits, 147. To the 90 leaves in Arabic, we have to add the four bifolios that I recently identified, see above. Thus, the total number of Arabic leaves is 98 out of 148.

87 Sirat *et al.*, Vingt manuscrits, 150.

88 Two small leaves of the *codex rescriptus* (i.e. ff. 115–116) disappeared between 1946 and 1957, coinciding with the end of the exhibition in Lucerne where the four Latin and Greek Aeneid leaves were displayed, as reconstructed in Fressura, I perduti ff della Biblioteca Ambrosiana, 241–273, 269. The fragment is attributed to the end of the 5th century/ beginning of 6th by Elias Avery Lowe, while it was dated from the end of the 4th to the beginning of the 5th by Giovanni Galbiati. See Pasini, Integrazioni e correzioni, 269 fn. 9.

89 Sirat *et al.*, Vingt manuscrits, 145; Pasini, Integrazioni e correzioni, 270–271. Pasini specifies the Anatolian-Palestinian location of the production of the Greek leaves on a palaeographical basis.

90 Pasini, Frammento greco-arabo, 41. The scholar compares the leaves with the script of another manuscript dated 861/862, of Palestinian origin (Sin. gr. NF MG 12 + Sin. gr. 210).

in Arabic whose content is still unknown, the *codex rescriptus* brought together Muslim, Jewish and Christian texts, as well as Virgil. It is worth noting the presence of texts accompanied by their translation, i.e. the Latin Virgil with translation into Greek, the Greek Septuagint with translation into Arabic, and the Hebrew Book of Prayers with Judeo-Arabic. The two bifolios containing the Greek Septuagint accompanied by its Arabic translation side by side are a significant factor in retracing the context of the entire object. Moreover, the Arabic script of the two bifolios has some New Style features in the writing of the Qurʾānic text, adapted to the script style of the Sinai and St. Saba scriptoria in the 8th/9th century.[91]

The two Qurʾānic leaves have two sections of the text of *sūra al-Nisāʾ*,[92] namely Q.4:34 (from *wa-hjurūhunna fī l-maḍājiʿ*) to Q.4:38 (supposedly *wa-lladhīna yunfiqūna*) on the flesh side of the first leaf, corresponding to f.86v of the *codex rescriptus*, and Q.4:38 (from *ʾamwālahum riʾāʾa*) to Q.4:43 (*wa-ʾin kuntum marḍā ʾaw*) on its hair side. The second leaf has the text from Q.4:95 (from *[al-ḥus]nā wa-faḍḍala*) to Q.4:101 (supposedly *ʿalaykum junāḥun*) on its hair side, corresponding to f. 91r and Q.4:101 (from *ʾan taqṣurū min-a l-ṣalawāti*) to Q.4:103 (supposedly the beginning of the verse) on its flesh side.[93]

Script style of the Qurʾānic text. The Qurʾānic text that has been cancelled to write the *Paterikon* is written in New Style script with features of NS III, according to Déroche's classification. Qurʾānic manuscripts written in a similar script include MSS BnF ar. 374a, 374c, 382a, and 382c. Despite the great limitations of direct inspection with the naked eye without the help of special images or special lights, which did not enable recognition of details of the traits of the letters, it was possible to identify a few distinctive letters of the New Style III, for example the isolated and final *alif*, initial and medial *kāf*, the ligature of *lām-alif* and final *nūn*. The consonantal skeleton is likely to be furnished by rare diacritics if a few strokes have this function rather than being spots of parchment material. It must be noted that no coloured dots or end of verse markers seem to have been added to the script.

There are Qurʾānic manuscripts in NS III that have an explicit date in their leaves, attesting dates such as 905, 926, 936, and 949, which support the hypothesis that NS III was introduced at the end of the 9th century and was widely used in in the 10th century.[94]

Elapsed time between the two layers. The *Paterikon*—probably written in Sinai in the 10th/11th century or 11th/12th century—was manufactured by using composite materials dating from the 4th–6th century (the Latin and Greek Aeneid) to the 10th–11th century (the Hebrew Bible leaves), the latter being (almost) contemporary with the text of the *scriptio superior*. In the case of the two Qurʾānic leaves, written probably in the 10th century, the period of time elapsing between the two layers is also relatively short.

Unfortunately, as already mentioned, the majority of the leaves, namely 96 Arabic leaves, have not been identified,[95] thus preventing any definitive interpretation of patterns in the reuse of previous documents. Nevertheless, the significant aspect of the reuse of materials to assemble the *Paterikon* is the diversity of materials, which implies an environment in which Latin, Greek, Arabic, Hebrew, and Judeo-Arabic texts were available, with a special component of bilingual texts, thus supporting the idea of a multicultural and multilinguistic context, as already observed for the Mingana-Lewis palimpsest and the Damascus leaf.

Size and format of the two layers. The *codex rescriptus* of *Apophthegmata Patrum* is acephalous and incomplete. It consists of 140 small parchment leaves in vertical format, measuring 17 × 13.5 cm. The leaves are structured in quires, mainly quaternions placed according to Gregory's rule.[96] On the basis of the quire structure and its triple numbering, Sauget suggested that the codex was originally composed of 176

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[91] Pasini, Frammento greco-arabo, 41 and fn. 32.

[92] The content was identified in Sirat *et al*., Vingt manuscrits, 147, although without specifying the precise sections of the text ('passages de la sourate IV').

[93] Here the *scriptio inferior* is illegible to the naked eye and the text is reconstructed on the basis of the length of the previous lines, the number of lines on the other three pages, and the identification of a few letters and words at l. 7 (Q.4:102, likely *maṭarin ʾaw kuntum*).

[94] Déroche, *Les manuscrits du Coran*, 51.

[95] I was able to inspect the four leaves of the 12th quire which have some lines of the *scriptio inferior* not covered by the *scriptio superior*. Although I was unable to identify the text from the direct inspection, the script is rounded and very small, the height of *alif* being 0.3 cm, and is likely to have been written at a time quite close to the text of the *scriptio superior*.

[96] Sirat *et al.*, Vingt manuscrits, 147.

small leaves, grouped into twenty-two quires.[97] The Christian Arabic text, arranged in sixteen lines, is written in dark brown ink and some introductory words referred to the narration are written in red ink (e.g. *qāla* and *ʾaḫbarū*).[98] Sauget observed that the quires have traces of three strata of numbering, Arabic, Coptic, and Georgian, the latter system being clear evidence of the place of production or, at least, of assembling, i.e. the Monastery of St. Catherine.[99] The Sinai production of the codex is also supported by the comparison of the text of the *Apophthegmata* with other manuscript texts of Sinai origin.[100]

The composite recycled materials have been adjusted to the small format of the new codex. Thus, for example, large Hebrew leaves have been cut vertically into twos and used as two bifolios in the new codex.[101] Large Arabic leaves measuring about 21–24 × 16.5 cm and showing a vertical arrangement of the lines seem to have been used without cutting or trimming the parchment, but simply rotating the leaf 90 degrees and folding the large leaf into the two small leaves of a bifolio.[102]

Another interesting adjustment can be seen in the two smaller Qurʾānic leaves, ff. 86–91. The two single leaves now measure 14.5 × 16.5 cm and 13.5 × 15 cm, with the text arranged in nine lines disposed in an oblong format of about 11.5 × 14 and 12 × 15.5 cm.[103] The distance between one base line and the following one is about 1.2/1.3 cm. The leaves have been rotated 90 degrees in order to change the oblong format into a vertical one, thus rebinding the oblong leaves in their new vertical format. Thus, the upper margins of the two oblong leaves have been used to make a stub that extends beyond the spine-fold, by folding the upper margin at 1 and 1.5 cm from the upper margin. Along the fold for making the stub, the sign of the quire structure of the *codex rescriptus* is still visible in the now flat and disassembled leaves. Then, the inner margins of the leaves with part of the writing area and likely the bottom margins have been trimmed to adjust the size of the oblong leaf to the new vertical leaf and the two single leaves put together. Thus, the Qurʾānic leaves in oblong format were originally larger, likely about 14.5 × 19.5 cm (ff. 86–91).

A final consideration with regard to the nature of the two single leaves placed in a flesh-hair, hair-flesh arrangement. As their inner margins have been cut, there are no traces revealing their possible original structure as a bifolio or leaves joined by means of a stub. A reasonable hypothesis is that the text after *wa-ʾin kuntum marḍā ʾaw* (in Q.4:43) was not interrupted but continued on a following leaf, and the text starting from *[al-ḥus]nā wa-faḍḍala* in Q.4:95 was completed by its previous part, namely subject and verb before *[al-ḥus]nā*, thus conveying a complete meaning in '[yet to each God has promised the reward] most fair'. Assuming a complete sequence of the Qurʾānic text from Q.4:43 to Q.4:95 and arranging the 1139 word lacuna in nine lines per page, about 90/100 words per page, the missing text would occupy six leaves that would fit perfectly between ff.86 and 91 of the *Paterikon*, suggesting at least a quaternion if we interpret the two single Qurʾānic leaves which ended up in Sinai as a recyclable writing surface. In this scenario, ff. 86–91 could have been a bifolio that has been kept in the new *codex rescriptus*, despite the change from oblong to vertical format and the trimming of the parchment. Without further data about leaves from the same Qurʾānic item, there is no evidence for supporting this hypothesis of an original outer bifolio.

3.4. From Ṣanʿāʾ

Provenance and context. These four palimpsests (three groups of leaves and quires belonging to a single project described in section 3.4.1, and one isolated single leaf in section 3.4.2) are part of the findings from the *genizah* practice within the Great Mosque of Ṣanʿāʾ discovered in the 1970s, 2007, and likely also earlier, in

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97 Sauget, Paterikon arabe, 474–475.

98 On the content of the *Paterikon*, see Löfgren and Traini, *Catalogue of the Arabic Manuscripts*, 18–19, Sauget, Paterikon arabe, and Faraggiana, Nota sul rapporto fra l'Ambr. L 120 sup.

99 Sauget, Paterikon arabe, 474–476, reported also in Pasini, Frammento greco-arabo, 35.

100 On the comparison of the text of the *apophthegmata* in the Ambrosiana manuscript with the Sinai manuscript tradition, see Faraggiana, Nota sul rapporto fra l'Ambr. L 120 sup.

101 See for example ff. 111–112 and 122–123 of the *Paterikon*. The two bifolios represent respectively the right and left half of an original large Hebrew leaf with the text of Deuteronomy structured in three columns.

102 See the bifolio constituted by ff. 90–87 of the *Paterikon*, with an unidentified Arabic text on its *scriptio inferior*.

103 Thus confirming the supposition by Déroche, who had access to the images of the hair side only and could only estimate the possible size and format of the leaf, in Sirat *et al.*, Vingt manuscrits, 147.

the 1960s. Apart from five leaves that left Yemen and ended up on the antiquarian market, all the leaves were in Ṣanʿāʾ until at least spring 2018.

The mosque had a deposit of unused and discarded manuscripts, mainly Qurʾānic leaves. After the 1970s discovery, 950 fragmentary copies of Qurʾānic text and 150 other religious texts dating from the 7th to the 11th centuries were identified. The hurried survey of the New Finds conducted in 2008 led to the suggestion that almost all the fragments and manuscripts are Qurʾānic texts from the 7th to the 11th century. For the discovery in the 1950s or 1960s, knowledge was passed down by the collective memory of local people, but there are no details about further Qurʾānic copies that could have been found together with the section of the Qurʾānic palimpsest now kept at al-Maktaba al-Sharqiyya.

In order to understand the possible connections between the fragments stored in the niches and above the ceiling of the mosque, it is important to know whether the two groups of manuscripts were deposited in two distinct periods. As Paolo Costa suggested that the mosque's structure was changed and adapted with the purpose of building new spaces above the ceiling level to host the rich library of the mosque,[104] it is likely that the niches behind the false wall were made, used, and closed before the building of the library space above the ceiling. In fact, the large and accessible *genizah*-space of the ceiling could have had hosted many more manuscripts without generating the need for a new *genizah* project in the two niches.

3.4.1. Dār al-Maḫṭūṭāt 01-27.1, al-Maktaba al-Sharqiyya and its scattered fragments, New Finds unnumbered single leaf

Structure. Three separate fragments were part of the same object. MS DaM 01-27.1 was restored in the 1980s and consists of flat single leaves, fragments, and one bifolio, kept together in a cardboard box.[105] The *codex rescriptus* of the al-Maktaba al-Sharqiyya still keeps its original quire structure and bifolios, apart from the leaves that were removed and put on the antiquarian market.[106] The NF single leaf is an isolated leaf among the recently discovered fragments. All the palimpsested Qurʾānic leaves and fragments were written on Qurʾānic leaves and quires.[107]

Language and culture of the two layers. Both layers are Qurʾānic text. The MaSh *codex rescriptus* and the DaM leaves were probably produced in the 7th/8th century by reusing Qurʾānic leaves written in the 7th century.[108] Although it is possible that the new leaves and manuscript were produced in Ṣanʿāʾ, using the recycled materials available, there is no evidence supporting this argument except the logical observation that the people in charge of manufacturing a *codex rescriptus* of the Qurʾānic text in Ṣanʿāʾ in the 7th and in the 9th/10th century would have had at their disposal a huge amount of Qurʾānic manuscripts rather than composite materials as in the case of the Sinai Monastery of St. Catherine in the period between the 9th and the 12th century.

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104 Costa, Moschea Grande di Ṣanʿāʾ, 490.

105 In 2007, at the time of the imaging, the Dār al-Maḫṭūṭāt held thirty-seven (fragments of) leaves under the classmark 01–27.1 (f. Q.31:24–32:20 being missing). The thirty-eight leaves have been entirely or partially accepted by scholars as part of a single entity. See Cellard, Review of *The Sanaa Palimpsest* and Cellard, Ṣanʿāʾ Palimpsest, 5.

106 Leaves removed from the MaSh section are in Copenhagen, at the David Collection; in Stanford, in the hands of a private collector; in Abu Dhabi, at the Louvre; and were sold by auction at Bonham's in 2000 and at Christie's in 2008. See Fedeli, Early Evidences of Variant Readings; Noja Noseda, La mia visita a Sanaa, 55–58; Sadeghi and Bergmann, The Codex of a Companion; and Sadeghi and Goudarzi, Ṣanʿāʾ 1 and the Origins. As regards the Abu Dhabi Louvre leaf recently identified, see Cellard, Ṣanʿāʾ Palimpsest.

107 The *scriptio inferior* of the NF leaf has not been identified, but presumably is Qurʾānic text. As regards the quire structure of the first layer, this is evident in the MaSh section, while it has been reconstructed in the case of the DaM section, see Cellard, Ṣanʿāʾ Palimpsest.

108 The dating is on a palaeographical basis. Moreover, pieces of the parchment from the DaM and MaSh sections have also been radiocarbon dated. A piece of the Stanford leaf (removed from the MaSh section) has been analysed at the Accelerator Mass Spectrometry Laboratory at the University of Arizona, estimating that the Ṣanʿāʾ parchment had a 95% probability of belonging to the period from 578 to 669 CE and a 75.1% probability of being older than 646 CE (see Sadeghi and Bergmann, The Codex of a Companion, 348, 353-354). Three parchment pieces from the DaM leaves (corresponding to Q.21:72, Q 6:159 and Q 20:74) have been analysed at the Centre de Datation par le RadioCarbone at the University of Lyon. The results gave respectively between 388 and 535 CE (radiocarbon age 1620 +/- 30 BP), 543–643 CE (radiocarbon age 1475 +/- 30 BP) and 433–599 CE (radiocarbon age 1530 +/- 30 BP). I retrieved the results from the BAnque NAtionale de DOnnées RAdiocarbone pour l'Europe et le Proche Orient of the Lyon Laboratory in May 2015 and February 2016. They are reported in Déroche, *Qurʾans of the Umayyads*,13 and Robin, L'Arabie dans le Coran, 65 (Appendice: Les manuscrits coraniques en écriture ḥijāzite de Ṣanʿāʾ: quelques datations).

The *scriptio superior* of the MaSh quires and their removed leaves has the text of the Qurʾān from Q.2:246 to 3:154; Q.3:179 to Q.5:111; Q.7:40 to 9:71; Q.9:168 to Q.10:75; Q.10:94 to 12:49; the DaM leaves have a more fragmentary sequence of the text, namely Q.6:49–73; Q.6:149–Q.7:11; Q.9:112–115 and 124–127; Q.14:32–41 (indicated as 15:32 and 15:41 on the parchment, i.e. its verso) and Q.14:52–15:16 (indicated as 15:1 and 15:16 on the parchment, i.e. its recto); Q.16:73–Q.17:6; Q.17:40–77; Q.18:22–32; Q.19:38–98; Q.20:1–130; Q.21:16–22:16; Q.25:10–59; Q.26:156–176 and 198–221 (indicated as 26:128 and 26:201 on the parchment); Q.27:25–49; Q.28:58–86; Q.29:29–54; Q.30:26–54; Q.31:24–33:37;[109] Q.34:52–35:18; Q.37:38–90 and 102–172; Q.38:73–39:6; Q.41:17–43 and 41:47–42:16; Q.42:21–48; Q.43:63–44:11; Q.47:15–48:2; Q.55:16–69; Q.57:1–22 and 57:27–58:22 and 59:1–60:1. The *scriptio superior* of the NF single leaf has 71:1–28 (from the *basmala* to the beginning of verse 28 which is covered by the natural rolling of the parchment) and Q.72:6–28 (until the end of the *sūra*).[110] Given the lacunae in the parchment material, it is difficult to identify clearly the sequence of the text on the recto and verso of the leaf.[111]

All the leaves of the new object *rescriptus* reuse Qurʾānic leaves. Due to the quality of images of the NF leaf, there are no conjectures about the section of the Qurʾānic text in its *scriptio inferior*, but the script style of the few recognizable letters seems to be the same as the other two sections of the object. The 41 MaSh leaves[112] are available and accessible only by means of the low-resolution pdf images in Hamdoun's thesis, which focus only on the *scriptio superior* of the palimpsest. Nevertheless, a few words and sentences are recognizable and thus allow a tentative and incomplete reading of some unedited leaves of the first layer, thus proposing words from Q.2, 4, 5, 6, 7, 75, 76 and 79+64, namely Q.6:130–137 (f. 1r); Q.7:28 (f. 3r); Q.2:243 (f. 4v); Q.2:257 (f. 5v); Q.2:229–232 and 2:225–227 (f. 8 recto and verso); Q.7:38 and 44 (f. 10v); Q.5:72 (f. 14v); Q.76:20–21 and 24 (f. 20v); Q.75:18–35 (f. 21r); Q.79:40–46 followed by Q.64:1–11 (f. 22r);[113] Q.2:153–161 (f. 25r); Q.2:177 (f. 26r);[114] Q.2:179–180 (f. 26v); Q.7:142–146 (f. 27v); Q.7:155 (f. 28r); Q.4:59–60 (f. 33r).[115]

The Qurʾānic content of the *scriptio inferior* of MS DaM 01-27.1 has been studied and published by Puin, Sadeghi-Goudarzi, and Hilali[116] and consists of sections from Q.2; 5; 35[117]; 11+8+9+19; 22; 33; 24; 16; 20+21;

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[109] The parchment Q.31:24–32:20 was not in situ in October 2007 and thus, is not part of the 2007 set of images but of the German microfilms only.

[110] The text, structured in 26 lines in both verso and recto of the leaf, has been written by hand B as identified by Cellard in DaM, see e.g. Cellard, Ṣanʿāʾ Palimpsest, fig. 6. Apart from identical letter shapes, the NF leaf shows a very interesting feature in understanding the complexity of the Ṣanʿāʾ palimpsest, namely the medallions just sketched in brown ink (as in Cellard, Ṣanʿāʾ Palimpsest, 10 and Hilali, *Sanaa Palimpsest*, 78).

[111] Q.71 starts with the *basmala* at the beginning of the page with an abundant margin, filled at a later stage with the text of *sūra al-Iḫlāṣ* (the Sincerity), while the side starting with Q.72:6 ends with the text of the last verse of the *sūra* and an abundant bottom margin. Thus, it is also possible to interpret the parchment as the end of *sūra* 72 plus the bottom margin and then the upper margin plus the beginning of *sūra* 71, showing the sūra order that is also attributed to Ibn Masʿūd, namely Q.72 followed by Q.71 (see Jeffery, *Materials for the History*, 22).

[112] In the 2004 Master's thesis by Hamdoun, only 72 sides of the 41 leaves are reproduced. In fact, these are the missing leaves and pages: 12r (between 11v/table 63 and 12v/table 65); 16v (between 16r/table 79 and 17r/table 81); 19v /between 19r/table 89 and 20r/table 91); f. 23r+v (the word *masjid* which is readable on the verso at the left of the recto in table 103 possibly from Q.7:29 or 7:31, implies the presence of a further leaf between table 101 and table 103, i.e. f. 23); 34v (between 34r/table 143 and 35r/table 145); 36r (between 35v/table 147 and 36vr/table 149); 37v and 38r (between 37r/table 151 and 38v/table 153); 40r (between 39v/table 157 and 40v/table 159) in Hamdoun, *al-Makhṭūṭāt al-Qurʾāniyya fī Ṣanʿāʾ*.

[113] Thus suggesting a *sūra* order that corresponds to the sequence attributed to Ubayy b. Kaʿab (see Lagarde, *Parfait manuel des sciences coraniques*, 235 and Jeffery, *Materials for the History*, 115), which should be compared with other points of the DaM palimpsest, i.e. the sequence of Q. 11+8+9+19; 12+18; 34+13 and 15+25. See also Cellard, Ṣanʿāʾ Palimpsest, 25.

[114] Here the manuscript text seems to have the reading without *wa -l-sāʾilīna* ('and those who ask'), which is also the reading attributed to Ubayy b. Kaʿab, see Jeffery, *Materials for the History,* 120.

[115] The identification of a few words and sections here proposed agrees with and complements Sidky's reading published in Cellard, Ṣanʿāʾ Palimpsest.

[116] See Puin, Früher Koranpalimpsest I, II, III, IV and V; Sadeghi and Bergmann, The Codex of a Companion; Sadeghi and Goudarzi, Ṣanʿāʾ 1 and the Origins; Hilali, *Sanaa Palimpsest*. Sadeghi and Goudarzi's edition also includes some leaves removed from the MaSh manuscript, thus reporting the sequence Q. 63+62+89+90 in the leaf auctioned at Christie's in 2008 and the sections from Q.2 and Q.5 in Stanford, the David Collection, and Bonham's leaves. The observations reported in this article are based on my work on the DaM palimpsest conducted between 2007 and 2008 that accompanied the imaging mission executed in 2007.

[117] In Sadeghi and Goudarzi, Ṣanʿāʾ 1 and the Origins, as I did not identify Q.12 before Q.18 in 2008.

28; 15+25; 30; 39+40; 37; 12+18[118]; 34+13.

Script style of the Qurʾānic texts. Both layers have Qurʾānic text written in the same script style, i.e. *ḥijāzī* style from the 7th century, as regards the *scriptio inferior*. Probably a few decades later, in the 7th/8th century, the leaves were recycled for writing a second layer of Qurʾānic text. Pieces of parchment from MS DaM 01-27.1 and from one leaf removed from al-Maktaba al-Sharqiyya have also been radiocarbon dated, giving somehow different results, possibly because of the contamination of the two objects that were kept in separate storage places.[119] Nevertheless, the dating range provided by the radiocarbon analyses confirm the antiquity of these parchment materials from the 7th century.

Elapsed time between the two layers. Thus, only a few decades passed between the production of the first Qurʾānic leaves and their reuse for writing a further Qurʾānic manuscript.

Size and format of the two layers. The parchment leaves measure about 37 × 28 cm (e.g. DaM 01-27.1, f. 1, Q.6:49–73, and 37 × 27.5 cm in f. 2, Q.6:149–7:11) but the DaM object is very fragmentary and in some cases only small pieces of parchment are extant from some leaves.[120]

The leaves of the first layer have been reused maintaining similar layout, measurements and format. The margins – quite meagre according to the habits of *ḥijāzī* style manuscripts – have not been trimmed, the leaves have not been folded and turned 90 degrees, but have been reused preserving the original format. In a few cases, the leaf has been used upside down by turning the parchment 180 degrees, e.g. MS DaM 01-27.1, f. Q.29: 29–54 and MS MaSh, f. Q.3:107–119.[121] Both texts are structured in a variable number of lines placed vertically, from 21 to 36 (mainly 24 to 27–28) lines in the *scriptio superior* and from 23 to 35 lines in the *scriptio inferior*. As already mentioned, even the script style is similar, resulting in the same height of the letters. The letter *alif*, for example, measures about 1.2 cm in the *scriptio inferior* and 1 cm in the *scriptio superior* (measurements taken randomly in MS DaM 01-27.1, f. 2v).

As regards the quire structure in the two layers, Eléonore Cellard has recently argued that the leaves of the *scriptio inferior* were organized in quires that were also partially retained in the *scriptio superior*. The DaM palimpsest still preserves one bifolio in its leaves, and the bifolio has been used as such in both layers. The al-Maktaba al-Sharqiyya section has evident traces of quires and bifolios.[122]

The fact that leaves with a continuous sequence of the text were also kept together in the production of the object *rescriptus* can be compared with the situation described above as regards the Sinai-Lewis palimpsest. Although in the Sinai *codex rescriptus* there are no traces of bifolios, as the Qurʾānic leaves have been adjusted to the new format of the small codex and the area of the large leaves has been trimmed, they have been kept together to make complete quires in the new codex.

The three Ṣanʿāʾ objects were part of the same project of *codex rescriptus*. If the single NF leaf is part of the same project, as is plausible, this would influence our perspective on the Ṣanʿāʾ palimpsest. The content of the new leaf in its *scriptio superior* (Q.71 and 72) implies a new horizon regarding the size of the scattered objects in their *scriptio superior*. Indeed, the possibility that the three objects were stored in three different places within the mosque, possibly in three different periods, must be considered, and this would necessarily imply that the *muṣḥaf* at a certain point was no longer a single item. The distinction between text (possibly almost all the complete—even if fragmentary—text from Q.2 to Q.72) and the object(s) is suggested by the fact that the text was composed of separated parts that were stored separately in three different places. It is quite implausible that the single item was separated into three pieces to be deposited in their respective sacred storage places. The fact that the text could have included a long portion from Q.2 to Q.72 supports the hypothesis that the Ṣanʿāʾ palimpsest was an (almost) complete *mushaf* while the possible existence of separate pieces (at least one in the roof and one in a niche of the wall) confirms the hypothesis of the Ṣanʿāʾ palimpsest—in its *scriptio superior*—as a fragmented text.

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[118] In Sadeghi and Goudarzi, Ṣanʿāʾ 1 and the Origins, as I did not identify that in 2008.

[119] See fn. 108.

[120] See Cellard, Ṣanʿāʾ Palimpsest, 6, regarding the different dimension of the parchment leaves kept at DaM and MaSh. According to the scholar, the latter leaves are smaller probably because they have not been treated with humidification and flattening.

[121] Table 49 in Hamdoun, *al-Makhṭūṭāt al-Qurʾāniyya fī Ṣanʿāʾ* (f. 8r). In its *scriptio inferior* I was able to read part of Q.2, namely words from verses 229, 231, 232 and 233.

[122] Cellard, Ṣanʿāʾ Palimpsest, 11f.

A further factor revealing the use and reuse of the Ṣanʿāʾ leaves is the presence of annotations in the margins. The NF leaf palimpsest shows signs of later use of the object. In fact, in the upper margin, before the beginning of Q.71 (*sūra Nūḥ*, i.e. 'Noah'), someone added the text of Q.112 (*sūra al-Iḫlāṣ*, i.e. 'the Sincerity'), consisting of a concise declaration of God's absolute oneness (*al-Tawḥīd*). The text of *sūra al-Iḫlāṣ* was added, possibly in the 9th/10th century, thus confirming the life of the object after its first production and later recycling process.[123]

3.4.2. Dār al-Maḫṭūṭāt 18–?.a

Structure. Single isolated Qurʾānic leaf written on a Qurʾānic text.

Languages and cultures of the two layers. Both layers are Qurʾānic text.[124] The *scriptio superior* has part of *sūra al-Furqān*, namely Q.25:1–17 (from its beginning to *ʾa-ʾantum aḍlaltum ʿibādī*)[125] that was written—likely in the 9th/10th century—reusing an older Qurʾānic leaf, containing part of *sūra al-Nūr*, i.e. Q.24:47–58.[126]

Script style of the Qurʾānic texts. The text of the *scriptio inferior* is written in an early Abbasid style which—assuming that the available image is not misleading—has some features in common with the transitional type A of Déroche's classification, i.e. with elements similar, for example, to MS BnF ar. 326d. The *scriptio superior* is in a New Style III script which is dated to the 9th/10th century.

Elapsed time between the two layers. As there are no elements for dating the production of the first layer, it is difficult to suggest how many years later the leaf was reused. The only conclusion is that the production of the leaf *rescriptus* is likely not contemporary with the first layer.

Size and format of the two layers. The parchment leaf measures 14 × 20 cm. The oblong format of the *scriptio inferior*—with the text arranged in 21 lines—has also been maintained in the *scriptio superior*—with the text in 18 lines—without turning or folding the original leaf. The text in New Style script has generous margins, while in the early Abbasid style script, the layout has smaller margins and the (possible) outer margin is non-existent, which could mean that the parchment was slightly trimmed.

3.5. Coptic Palimpsest of Unknown Provenance

Provenance and context. This item was sold at auction by Christie's without details about its provenance, which is presumed to be Egypt on the basis of the content of the *scriptio inferior* of the leaves, i.e. a Coptic text reused to write a section of Qurʾānic text. However, nothing is known about the wider context/deposit of which the manuscript was arguably a part.

Structure. The item sold at Christie's in April 2018 was composed of nine isolated leaves whose present location is unknown. All the nine leaves have Qurʾānic text produced using recycled materials in Coptic as recognized by Cellard.

Languages and cultures of the two layers. The *scriptio superior* has fragments of *sūra al-Māʾida* and *sūra al-Anʿām*[127], written reusing Coptic leaves in the Sahidic dialect containing sections of Deuteronomy

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123 The text of *sūra al-Iḫlāṣ* has been added in the upper margin of the first side of a bifolio that starts with Q.58:8 (*bi-l-ʾiṯmi wa-l-ʿudwāni*). In another isolated leaf, starting with the end of Q.23:89 (*tusḥarūna*), another section of the same *sūra* (Q.23:47–58) has later been added in the upper and outer margins.

124 The UNESCO CD, reviewed and explored by Puin and Small in 2007 (Small and Puin, UNESCO CD of Ṣanʿāʾ Mss), provides only one side of the leaf.

125 The text has a few distinctive readings, namely *yakūnu lahu jannatun* (in Q.25:8) which corresponds to the *qirāʾa* of al-Aʿmaš as reported in al-Šarfī, *Al-muṣḥaf wa-qirāʾātuhu* 68 (vol. 3); *wa-yawma naḥšuruhum* (in Q.25:17) which corresponds to the *qirāʾa* of the majority of readers from Kūfa, e.g. al-Nāfiʿ, see *ibid*. 70 (vol. 3) and *fa-ṭallū* (in Q.25:9).

126 In addition to some common orthographic features, the text has a distinctive reading in Q.24:54 for *wa-mā ʿalā l-rasūli illā l-balāġu l-mubīnu* (i.e. 'It is only for the Messenger to deliver the manifest Message'). As there is no space for the article before *rasūl* whose *lām* is not in its final shape but seems to be followed by a denticle and *alif*, it is possible to suggest the reading *wa-mā ʿalā rasūli-nā illā l-balāġu l-mubīnu* which corresponds partially to the expression used in Q.5:92 (i.e. *anna-mā ʿalā rasūli-nā l-balāġu l-mubīnu*).

127 In April 2018, I transcribed only part of the text of the leaves from the images—now no longer available—connected with the auction, thus reading Q.5:44–45, 53–57, 119–120; Q.6:1–11. Christie's catalogue reports Q.5:40–58, 69–76, 83–88, 116–120 and Q.6:1–9. Cellard presented some results relating to the Qurʾānic and Coptic leaves at the IQSA conference in Denver, November

and the Book of Isaiah, probably written within the Coptic community in the 6th century in the region of Middle Egypt between Abydos and Hermopolis.[128] Thus, the Copto-Arabic palimpsest can be compared with the Damascus leaf, whose Greek Book of Esther was used for writing the Qurʾānic text three or four centuries later.

Script of the Qurʾānic text. The early Abbasid script style, close to group CI in Deroche's classification, suggests the 8th century as a possible dating.[129]

Elapsed time between the two layers. Thus, about one or two centuries elapsed between the production of the Sahidic text of the Bible and its reuse for writing the Qurʾānic text.

Size and format of the two layers. The measurements indicated in Christie's catalogue are 11.1 × 12.7 cm for the largest fragment. The Arabic text is arranged in eleven lines per page. The Coptic text is arranged in two columns and its leaves have been folded without being turned 90 degrees.[130]

3.6. Unknown and Unrecognized Qurʾānic Palimpsests, e.g. the Fustat Geniza

To assemble the Ambrosiana *codex rescriptus* with its 140 small leaves, 90 Arabic leaves were reused in addition to the eight leaves recently recognized as part of the same codex. Among them are two Qurʾānic leaves, while 96 leaves are still unidentified. There are probably still further items that need to be identified and added to the meagre list of Qurʾānic palimpsests enumerated above. Their study is rendered more difficult because the erased layers are rarely legible with the naked eye, and images, if they are available at all, are often of uneven quality. Thus, for example, it was possible to identify parts of the content of the low-resolution pdf images of Hamdoun's thesis, although the results are not comparable to the reading of the images of the DaM leaves sized to 4888 × 6510 pixels at 300 ppi.

Thus, sometimes, traces of older palimpsested objects are not immediately evident but appear at a later point in the course of our studies. This is what happened with the manuscript from the Museum of Islamic Art in Doha and further leaves from the National Library in St. Petersburg that once belonged to the same object.[131] Only through extended and frequent study of the leaves was it possible to recognize a few traces of earlier writing, but only proper multispectral imaging will allow scholars to identify the text of the *scriptio inferior*. Despite it being unidentified, the faded ink of the stratified object reveals that in assembling the *rescriptus*, the format, layout, and script style of the earlier layer were maintained, i.e. the *ḥijāzī* script style in vertical format, like in the Ṣanʿāʾ palimpsest (i.e. MSS DaM, MaSh and NF).

Thus, still-unidentified faded traces of a previous script that seems to have been erased to enable the support material to be recycled, rather than being mere corrections of single words, would suggest the presence of Qurʾānic palimpsests also in the Mosque of ʿAmr in Fustat, the old Cairo. There, early Qurʾānic manuscripts from the beginnings of Islam were kept for centuries. It may be possible to discover further leaves through special imaging, and thus to gain a new perspective on Fustat as a location where *genizah* practices were applied not only to the so-called 'Cairo Geniza' in a Jewish environment, but also to the mosque from a Muslim *genizah* perspective. In fact, the two buildings were a few metres from one another, in a multicultural and multilinguistic context.[132]

2018 in her paper From Coptic to Arabic: A New Palimpsest for the History of the Qurʾan in Early Islam. After submission of the present article, Cellard and Louis' article has been published reporting the content of the manuscript, i.e., Q.5:40–59, 5:69–89 and 5:116–6:11 (Cellard and Louis, From Coptic to Arabic, 46) and a detailed analysis of the artefact.

128 See Cellard, Une nouvelle contribution; Cellard and Louis, From Coptic to Arabic, 57, 77–86. The identified sections are Deuteronomy 6:3–4, 16–17, 9:5–6a, 14b–16a, Isaiah 40:15–16 (?), and Louis edited Isaiah 40:21–22a, 26–27 (f. 9) and 42:7b–9a and 42:23–24 (f. 8), see Cellard and Louis, From Coptic to Arabic, 86–94.

129 Cellard and Louis, From Coptic to Arabic, 49–51, 63.

130 See also Cellard and Louis, From Coptic to Arabic, 47–49, reporting the size of the least damaged folio (f. 9), i.e., 120 mm high by 131 mm wide. The nine leaves are part of two original quires (ff. 1–7; ff. 8–9).

131 See, for example, Museum of Islamic Art of Doha, MS.67.2007, ff. 2v and 3r. I am waiting for special images of the MIA leaves to verify my hypothesis and identify the text of the possible *scriptio inferior*.

132 See Vorderstrasse and Treptow, *A Cosmopolitan City*, 35.

4. DEPOSITS: RELATIONSHIP BETWEEN THE STRATIFIED OBJECTS

Palimpsests are like stratigraphic sequences revealing distinct phases of production on an archaeological site, although the stratigraphic relationship between the two (or more) layers is neither evident nor necessary within a palimpsest. The place of production of the two textual objects linked in one palimpsest is not necessarily the same, and the people involved in the production of the second layer are not necessarily aware of the nature of the first layer. This archaeological approach to palimpsested objects leads us to consider the crucial aspect of reconstruction of deposits and cultural identities. In fact, such stratigraphic manuscripts are an important way into studying the availability of documents in a certain place and period. In understanding and investigating palimpsests, Cavallo suggests a few questions: were the different ancient texts produced in the same area? Where? Did they arrive in the scriptorium in which they were assembled to produce new material as dismembered leaves/quires, or as a single object? What about the provenance of the older texts?[133]

Agati observes a certain connection between script and language from an archaeological perspective. Thus, for example, Greek script and language in the first stratum might be replaced by Latin, Syriac, Arabic, and Hebrew in the *scriptio superior*, providing details about the new context in which the fragment is found reused.[134]

As regards Qurʾānic palimpsests, the context in which the new objects have been produced is known, except in the case of the Coptic fragment sold by Christie's. Thus, concluding from the elements described above, Qurʾānic texts were replaced by Christian Arabic texts in the Sinai scriptoria by destroying the codicological structure of the original manuscripts, while they were replaced by Qurʾānic texts, in a similar script and format, in the Ṣanʿāʾ Mosque context. However, in both situations, bifolios and leaves have been kept quite close together in assembling the quires of the new *codices rescripti*. This means that even if the recycled parchments arrived at the scriptoria as empty parchments ready for reuse, leaves from a single manuscript were kept together, probably also because of their size, format, thickness, and quality.

Qurʾānic texts replaced Biblical texts—in Greek and Coptic—and Qurʾānic texts. The latter case refers to the Ṣanʿāʾ Mosque, while examples of the former process belong to the multicultural deposit of Damascus and to an unknown location in Egypt. From a perspective of chronological stratification, it seems reasonable to suppose that texts written in roughly the same period or within a short distance of time, such as the two Qurʾānic strata in the Ṣanʿāʾ palimpsest, were part of the same cultural and manufacturing context. As regards the composite Sinai palimpsests, some reused leaves were produced centuries before the *codex rescriptus*, while others were reasonably contemporary. Moreover, in the case of the Ambrosiana palimpsest, Pasini observed that the Arabic-Greek text of the Septuagint in the *scriptio inferior* was produced in Palestine, probably in the Sinai region.

In fact, even more significant in terms of the archaeological context is the question of the languages and scripts that were in contact with the Qurʾānic texts in the manufacturing of the new quires. Excluding the single-leaf cases, it can be noted that the Ṣanʿāʾ environment seems to have had at its disposal only Qurʾānic texts, and this matches our knowledge of the nature of the texts from the *genizah* practice in the mosque. The Sinai palimpsests represent a wider range of texts available in the 9th/10th and 11th/12th century: in one object, Qurʾānic leaves, unidentified Arabic texts, the Hebrew Bible, the Hebrew Siddur and its notes in Judaeo-Arabic for the liturgy, Latin Virgil and its Greek translation, Greek New Testament commentary, the Septuagint and its translation into Arabic; and Syriac apocryphal Gospels,[135] the Peshitta of the New Testament, a Syriac hymn, the Greek Genesis, an Armenian New Testament, Christian Arabic texts, and Muslim documentary texts together with Qurʾānic leaves in the other repository.

Thus, following Cavallo's interpretation, palimpsests are archives, and 'documenti di riconversione di materiali e di stratificazione di tecniche e di testi di grandissimo interesse culturale'.[136] Cavallo observes that it is

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133 Cavallo, Immagine ritrovata, 13.

134 Agati, *Manuscript Book*, 71.

135 Syriac leaves from the *Protevangelium Jacobi* and the *Transitus Mariae* were also used in assembling the *Codex Arabicus*, Sin. ar., 514, see the contribution of Grigory Kessel in this book. The upper text was written probably in the 9th/10th century in a script style similar to the *scriptio superior* of the Cambridge-Lewis *codex rescriptus* of Arabic homilies.

136 Cavallo, Immagine ritrovata, 11. The scholar uses the term 'archivi' ('Vi sono codici palinsesti che – assemblati con spezzoni di vari e più antichi manoscritti – costituiscono 'mausolei', per adoperare un'espressione di Lowe, o piuttosto 'archivi', nei quali sono

common practice to focus on the *scriptio inferior* of palimpsests, and the history of Qurʾānic palimpsest studies strongly confirms this approach. Thus, he invites scholars to pay great attention to the *scriptio superior* as well. The main feature of palimpsest is the destruction of previous texts that somehow survive, while Cavallo astutely emphasizes that the reuse of parchment implies a transformation of old texts into new ones, a survival of documents that are placed in a new cultural context,[137] a reallocation of important resources, just like the pieces of old columns used for building the new columns of the Great Mosque of Ṣanʿāʾ, that later housed discarded manuscripts and palimpsests.[138]

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depositati documenti rari o unici di storia della trasmissione dei testi o della cultura scritta').

137 Cavallo uses the concepts of *Überleben* and *Nachleben* (Cavallo, Immagine ritrovata, 13: 'Il reimpiego in questo caso ha significato – per adoperare due termini della lingua tedesca – non un *Überleben*, una pura sopravvivenza alla distruzione, ma un *Nachleben*, una trasformazione di vecchi in nuovi libri, quindi l'inserimento in un nuovo contesto culturale'). The scholar is mainly focusing on the *disiecta membra*, several texts reused to assemble a new codex.

138 See the stratigraphy of the Great Mosque in Costa, Moschea Grande di Ṣanʿāʾ 489–490. The comparison between the mentality of washing or erasing previous texts for their reuse and the similar approach in reusing materials for building monuments is underlined in Cohen, Geniza for Islamicists, 136–137.

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Greek Palimpsests in the Patriarchal Library in Istanbul and the Making of a Palimpsest in 15th-Century Constantinople

This paper is part of an ongoing team project led by the Institut de recherche et d'histoire des textes in Paris devoted to the cataloguing of Greek manuscripts in the Library of the Ecumenical Patriarchate of Constantinople under the patronage of His All Holiness Patriarch Bartholomew. Two collections of manuscripts in the Patriarchal Library have been submitted to a new in-depth examination by our team (although none of the most recent imaging techniques have yet been applied to the manuscripts). In this paper, I would first like to give a general overview of the finds that were made by our team regarding palimpsests. I will then turn to one particular palimpsest to present it mainly from a codicological point of view, as it gives some insight into the ways parchment manuscripts were reused to make palimpsests in 15th-century Constantinople.

A SURVEY OF THE PALIMPSESTS IN THE PATRIARCHAL LIBRARY IN ISTANBUL

Collection of the Holy Trinity

The collection of the Holy Trinity is what remains of the library of the Monastery of the Holy Trinity on the island of Halki (Heybeli ada), in the sea of Marmara, opposite Istanbul. This monastery, which goes back to the Byzantine period, was refounded by the future Patriarch of Constantinople Metrophanes III in the first half of the 16th century. Being a literate man and a true bibliophile, he endowed the monastery with a rich library which numbered up to 300 Greek manuscripts. During the following centuries, the library was regularly visited by Western travellers who took away many volumes, now mostly in Western libraries. In 1936, the remaining manuscripts were transferred to the Patriarchal Library in Phanar.[1] As far as palimpsests are concerned, the cataloguing campaign has proven very successful, since ten manuscripts that contain palimpsest portions (out of a total number of 147 manuscripts in the collection) were identified and described in the catalogue published in 2019 by Matthieu Cassin, Marie Cronier, Matoula Kouroupou, and myself.[2] Three different situations can be observed.[3]

Four manuscripts are entirely or mainly palimpsest; they were copied on reused parchment between the 13th and the 15th century:

- The first manuscript (Trin. 133) is the famous 10th-century palimpsest of the *De Cerimoniis* by Emperor Constantine VII Porphyrogenitus.[4] The text of the lower layer was first identified by Cyril Mango and Ihor Ševčenko in 1960. Another part of the same original manuscript was discovered a decade later by Otto Kresten in the lower layer of an Athonite manuscript (Hagion Oros, Μονὴ Βατοπεδίου, 1003).[5] The upper layer of the Istanbul manuscript contains a collection of ascetical works by Ephrem that was copied in the second half of the 13th century by two different scribes, one of them using new parchment, the second using reused parchment

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[1] See a short history of the library of the Holy Trinity in Binggeli *et al.*, *Catalogue*, I, ix–xi.

[2] Only 142 manuscripts are actually described in the catalogue. Five are missing from the collection. Our team had direct access to only 138 manuscripts. The others are described from microfilms.

[3] On the different uses of palimpest folios, see for example Mondrain, La réutilisation, 117–118, who cites Alfred Jacob.

[4] On this manuscript see Binggeli *et al.*, *Catalogue*, I, 358–360 (with relevant bibliography), and II, pl. 271.

[5] We did not have direct access to this manuscript and our description was made on the basis of the microfilm made by the American mission of Dumbarton Oaks in 1962. On Mango and Ševčenko's discovery, see Mango and Ševčenko, A New Manuscript. On Kresten's discovery see Haldon, *Constantine Porphyrogenitus*, 36 (n. 6).

from a single copy of the *De Cerimoniis*,[6] both scribes alternating in the manuscript according to the distribution of the quires. Without a codicological analysis of the manuscript itself, it is for the moment impossible to conclude whether the second scribe restored the manuscript or worked in collaboration with the first scribe.[7] The Vatopedi manuscript, a Theotokarion, is also only partly palimpsest. The entire manuscript was copied by the same scribe as the one who copied the palimpsest parts of the Istanbul manuscript. While the first part of the Vatopedi manuscript is on new parchment, the scribe reused for the second part (ff. 72–103, 106–109, 112–135) the same palimpsested exemplar of the *De Cerimoniis*.[8] It therefore seems likely that an out-of-use volume of the *De Cerimoniis* was dismembered and palimpsested in the late 13th century and subsequently used by a scribe to copy (or restore?) two books—and probably more—, most probably in a monastic environment, considering the content of the books.

- A second manuscript (Trin. 124) is an exegetical collection of homilies by John Chrysostom dating to the first half of the 14th century.[9] The manuscript is entirely palimpsest, except for a 16th-century restoration on paper at the beginning and at the end (ff. 1–2, 208–211). The scribe apparently reused a single 9th-century majuscule exemplar of the ascetical corpus of Basil of Caesarea that was identified by Marie Cronier, making it the most ancient preserved copy of the so-called Stoudite recension of this work.[10] There is no indication as to where the parchment was reused and the manuscript copied, but it arrived at the Holy Trinity in the middle of the 16th century.
- A third manuscript (Trin. 102) is a Panegyrikon copied in 1435. It is entirely palimpsest, including the fly-leaves, and reuses almost exclusively a monumental 11th-century pre-metaphrastic Panegyrikon covering the whole year, except for two odd folios (ff. 114 and 281) taken from other liturgical manuscripts, the second one being a double palimpsest.[11] It will be discussed in more detail in the second part of this paper.
- The fourth manuscript (Trin. 29) is a Parakletike of the late 13th or early 14th century. It is entirely palimpsest except for a paper restoration (ff. 63–64). The lower layer has remained unfortunately completely illegible to scrutiny with the naked eye.[12]

In contrast to most of the palimpsest material from Sinai, all of these Greek manuscripts from the 13th to 15th century, as far as we have been able to examine them, reuse exclusively or mainly one single palimpsested manuscript.

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[6] Scribe 1 (165 parchment folia): ff. 1–30, 40–63, 94–125, 133–211 (= quires I–IV, VI–VIII, XIII–XVI, XVIII–XXVIII) – Scribe 2 (115 palimpsest folia): ff. 31–39, 64–93, 126–132, 212–279 (+ 214a) (= quires V, IX–XII, XVII, XXIX–XXXVII). See Binggeli *et al.*, *Catalogue*, I, 359.

[7] Mango and Ševčenko, A New Manuscript, 248, assume that it is a restoration. Two arguments argue in favour of this hypothesis. First, the quires copied by the second scribe end with blank spaces (end of f. 39^{r} and f. 39^{v}, second half of f. 93^{v}, second half of f. 132^{r} and f. 132^{v}), which would indicate poor coordination in the case of a shared copy. A second argument in the same direction is that the quire marks, in the middle of the lower margin, which run throughout the whole manuscript (without however taking into account the loss of one quire between ff. 109 and 110), seem to be due to the second scribe. Moreover, some traces of the original quire marks can still be seen in the lower external corner and seem to indicate that some losses occurred in the interval between both scribes: ιγ΄ (f. 48^{r}), κ΄ instead of ιθ΄ (f. 94^{r}), λδ΄ instead of λβ΄ (f. 193^{r}), λε΄ instead of λγ΄ (f. 201^{r}). Conversely, it must be noted that both scribes are more or less contemporary since they both use an archaizing script that can be dated to the second half of the 13th century (more precisely to the years 1280–1300 for the second scribe, according to Featherstone *et al.*, Studien zu den Palimpsestfragmenten des sogenannten „Zeremonienbuches“ I. Prolegomena, 425–426 [n. 12]), so that the interval between the first and the second scribe would be a fairly short one in which to imagine a large-scale deterioration of the manuscript. Moreover, the extent of text copied by the second scribe (15 quires out of 37 preserved, not far from half of the manuscript) seems to go beyond a simple restoration of a model in poor condition.

[8] The only available and very brief description of the Vatopedi manuscript was done in 1924 by Eustratiades and Arkadios, *Κατάλογος*, 181. See also Featherstone *et al.*, Studien zu den Palimpsestfragmenten des sogenannten „Zeremonienbuches“ I. Prolegomena, 425–426 (n. 12). I thank Otto Kresten for sharing with me a complete description of the Vatopedi manuscript to be published in Kresten *et al.*, Studien zu den Palimpsestfragmenten des sogenannten „Zeremonienbuches“ II. Codex Athous Vatopedinus 1003 (forthcoming).

[9] Binggeli *et al.*, *Catalogue*, I, 333–335, and II, pl. 253.

[10] Cronier, Un nouveau palimpseste.

[11] Binggeli *et al.*, *Catalogue*, I, 278–283, and II, pl. 206–208.

[12] Binggeli *et al.*, *Catalogue*, I, 51–5283, and II, pl. 48.

Three manuscripts present a second scenario for the reuse of palimpsested parchment. All three are parchment manuscripts of the 11th or early 12th century whose lacunae were restored in the 14th century with reused parchment in order to keep a unit of material:

- Trin. 13 is a Praxapostolos of the 11th century, whose final lacuna was repaired in the second quarter of the 14th century with four folios (ff. 231–234) of reused parchment. Matthieu Cassin was able to identify in the lower layer fragments of a Panegyrikon of the 9th–10th century in a majuscule script.[13]
- Trin. 76 is an 11th century metaphrastic Menologion for September. It was restored several times, including in the first half of the 14th century. The two scribes used a paper bifolio to complete a first quire (ff. 40/47), then palimpsested parchment for the next quire (ff. 48–55). The reused parchment comes from a Triodion of the 12th century.[14]
- Trin. 75, the last manuscript in this category, presents a slightly different situation. It is a Synaxarion and Typikon of the 11th or beginning of the 12th century. According to historical notes in its margins, the manuscript arrived in the city of Sougdaia (Chersonessos) in the second half of the 12th century, before 1186. At the end of the 12th or the beginning of the 13th century, two folios of reused parchment (ff. 216–217) were added at the end of the manuscript, in order to copy an additional text concerning a local saint, the *Life of Stephen of Sougdaia*. The lower layer contains a Lectionary of the Gospels in a majuscule script of the 9th–10th century.[15] The reused parchment concerns in this case an addition, rather than a restoration, and it was done at a relatively early date compared to the other palimpsests.

The last category concerns manuscripts that have palimpsest fly-leaves that were added with the binding:

- Trin. 41 is a paper Pentekostarion of the second half of the 15th century. At the beginning and at the end, it has two palimpsest folios folded in two and used as fly-leaves (ff. I–II and III–IV). The upper layer contains a liturgical book (Triodion and Pentekostarion) of the 13th century; the lower layer in majuscule remains as yet undeciphered. It is not known when and where the palimpsest folia were used as fly-leaves.[16]
- Trin. 104 is a paper Panegyrikon of the mid-14th century. It has one palimpsest fly-leaf at the end (f. XII). The lower layer has been identified by Matthieu Cassin as a 10th–11th century fragment of a homily of John Chrysostom. The text was erased but not rewritten. A short ascetical extract was copied much later, in the 18th century, on the fly-leaf. The manuscript has a 16th-century binding that was made when the manuscript arrived at the Monastery of the Holy Trinity with 11 paper fly-leaves at the beginning. The palimpsest fly-leaf at the end was probably added at an earlier date, during a previous binding operation.[17]
- Trin. 116 is a parchment collection of the homilies *In Genesim* by John Chrysostom of the beginning of the 11th century. Two palimpsest folios (ff. I–II) were added at the beginning of the volume as fly-leaves. The lower layer contains a Triodion of the 13th–14th century. In this case too, the text was erased but the folios were not rewritten. The fly-leaves must have been added when the manuscript received its current binding, probably in the 15th or the 16th century—in any case, before its arrival at the Holy Trinity.[18]

The use of parchment as fly-leaves is easily explained by the resistance of this material compared to paper. However, no palimpsest fly-leaves have been found in bindings that can be positively ascribed as having been made at or for the Monastery of the Holy Trinity in the 16th century.[19] So, in all three cases mentioned here, the palimpsest fly-leaves must have been added during a previous binding operation. Moreover, in two manuscripts (Trin. 104 and 116) the lower layer has been erased, but the folios were not rewritten. It is therefore likely that the binders had at their disposal a bin of palimpsested parchment sheets that were maybe originally intended as material for writing, as is the case with manuscripts copied by George Baiophoros and bound at the Monastery of the Prodromos of Petra in the early 15th century.[20]

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[13] Binggeli *et al.*, *Catalogue*, I, 24–26, and II, pl. 19.
[14] Binggeli *et al.*, *Catalogue*, I, 201–204, and II, pl. 146.
[15] Binggeli *et al.*, *Catalogue*, I, 193–201, and II, pl. 144.
[16] Binggeli *et al.*, *Catalogue*, I, 80–81, and II, pl. 76.
[17] Binggeli *et al.*, *Catalogue*, I, 285–288, and II, pl. 212.
[18] Binggeli *et al.*, *Catalogue*, I, 316–318.
[19] See in the index of Binggeli *et al.*, *Catalogue*, I, 479, under ‘Reliures’, the entries ‘Sainte-Trinité’ and ‘Griffon’.
[20] See for example the fly-leaves of manuscript Vatican City, BAV, Vat. gr. 19 (ff. I–IV), copied by George Baiophoros, with a binding from the Prodromos of Petra: Cataldi Palau, Legature Costantinopolitane, 260, and Cataldi Palau, Un nuovo manoscritto palinsesto, 301 (n° 14); also many other examples in the list *ibid.*, 298–301.

The Panagia Collection

The Panagia collection comes from the Monastery of the Panagia on the same island of Halki. This monastery was refounded a few decades before the Holy Trinity, at the very end of the 15th century.[21] The collection today numbers 178 shelfmarks and the catalogue published in 2008 by Matoula Kouroupou and Paul Géhin includes only two small palimpsest portions:[22]

- The first manuscript (Pan. 60) is a Menaion from September to December, from the beginning of the 13th century. The manuscript is no longer in the Patriarchal Library in Istanbul and therefore was not described by Kouroupou and Géhin in their catalogue.[23] Very recently, however, I was able to identify its current location in the Library of the University of Michigan at Ann Arbor, under the shelfmark 8, the book having been purchased in Constantinople by the University of Michigan Expedition in December 1919.[24] It has a restoration, probably of the end of the 13th century or during the 14th century, with eight palimpsest folios (ff. 96 and 106–112). The lower layer, in a biblical majuscule, maybe of the 6th–7th century, contains fragments of a Praxapostolos.[25] Based on certain elements of the decoration, Nadezhda Kavrus-Hofmann suggests that the 13th-century Menaion could be of Palestinian origin,[26] but there seems to be no indication as to where the restoration was made nor, for that matter, as to when and how it arrived at the Monastery of the Panagia.
- The second manuscript (Pan. 128) is a liturgical book of the 15th century containing a service for the feast of St. George on 23 April. Eight loose palimpsest leaves that are folded in two (or half leaves) have been inserted into the volume.[27] According to Athenagoras of Paramythia, who saw the manuscript in 1921–1922, at that time they served as a binding for the manuscript, which now remains unbound.[28] The lower layer of these palimpsest folios contains fragments of a Lectionary of the Gospels in a liturgical majuscule of the 9th century,[29] while the upper layer contains fragments of a Parakletike of the 13th century.[30] There is no indication of the history of the manuscript and the date when the palimpsest folios were used for the binding, however this must have occurred before it arrived at the Monastery of the Panagia, as there are no other examples of this type of binding in the monastery's library.

The palimpsests found in the Patriarchal library can thus be summarized in the following table:[31]

Shelfmark	Contents	Palimpsest folios	Upper layer		Lower layer	
Trin. 13 (*Diktyon* 33511)	Restoration	4	Praxapostolos	14 (2/4)	Panegyrikon	9–10 (majuscule)
Trin. 29 (*Diktyon* 33527)	Entirely palimpsest	84	Parakletike	13 ex–14 in	?	

[21] For a brief history of the library of the Panagia, see Kouroupou and Géhin, *Catalogue*, I, 13–23.

[22] Only 171 manuscripts are actually described. Seven are missing from the collection. The cataloguers had direct access to only 160 manuscripts, the others being described from microfilm.

[23] Kouroupou and Géhin, *Catalogue*, I, 189. It was last catalogued by Athenagoras, Κατάλογος, 11 (1935) 158–160.

[24] See Binggeli, Un nouveau manuscrit. For brief descriptions of the manuscript after it arrived at Ann Arbor, see Clarke, *A Descriptive Catalogue*, 277; de Ricci and Wilson, *Census*, 1104; and the website of CSNTM, with digital images of the manuscript (http://images.csntm.org/Manuscripts/GA_Lect_1611/GA_Lect_1611.pdf [accessed 01.07.2023]). The dating of the manuscript to the first half of the 13th c. is due to Kavrus-Hoffmann, Discovering Hidden Treasures, 81 and fig. 2. See now Kavrus-Hoffmann, *A Catalogue*, 8–11.

[25] On the dating of the underwriting see Kavrus-Hoffmann, *A Catalogue*, 10. Welte, Die griechischen Palimpseste, 25, dates the underwriting to the 9th century.

[26] Kavrus-Hofmann, Discovering Hidden Treasures, 81; Kavrus-Hofmann, *A Catalogue*, 10–11.

[27] Kouroupou and Géhin, *Catalogue*, I, 333–336, and II, pl. 183.

[28] Athenagoras, Κατάλογος, 12 (1936) 303: 'Εἶναι σταχωμένα δι' ἑπτὰ φύλλων μεμβράνης παλιμπσήστου καὶ ἐν τέλει δι' ἑπτά'. Today there are five complete folios (ff. I–V) and four half folios (ff. VI–IX); originally there must have been six complete folios (ff. VI and VII are the two halves of the same folio) and two half folios (ff. VIII and IX do not join): see Kouroupou and Géhin, *Catalogue*, I, 334–335. The sewing holes that were made during the binding operation are visible on the folio: *ibid.*, II, pl. 183.

[29] The manuscript is not listed in Aland's *Kurzgefasste Liste*.

[30] The upper writing is dated to the 15th century by Kouropou and Géhin, *Catalogue*, I, 335.

[31] We did not have the opportunity to make a survey of the collection of the Theological School, but according to Tsakopoulos, *Περιγραφικὸς κατάλογος*, none of the manuscripts in that collection are palimpsests.

Shelfmark	Contents	Palimpsest folios	Upper layer		Lower layer	
Trin. 41 (*Diktyon* 33539)	Fly-leaves	2	Triodion	13	?	majuscule
Trin. 75 (*Diktyon* 33573)	Addition	2	Synaxarion	12 ex–13 in	Lectionary of the Gospels	9–10 (majuscule)
Trin. 76 (*Diktyon* 33574)	Restoration	8	Menologion	14 (1/2)	Triodion	12
Trin. 102 (*Diktyon* 33600)	Entirely palimpsest	297 (161)	Panegyrikon	1435	Panegyrikon + 2 odd folios	11
Trin. 104 (*Diktyon* 33602)	Fly-leaves	1	No rewriting		John Chrysostom	12
Trin. 116 (*Diktyon* 33614)	Fly-leaves	2	No rewriting		Triodion	13–14
Trin. 124 (*Diktyon* 33622)	Entirely palimpsest	205	John Chrysostom	14 (1/2)	Basil of Caesarea	8–9 (majuscule)
Trin. 133 (*Diktyon* 33631)	Partially palimpsest	115	Ephrem	13 (3/4)	Book of Ceremonies	10 (3/4)
Pan. 60 (*Diktyon* 33705) (now Ann Arbor 8 [*Diktyon* 864])	Restoration	8	Menaion	13 (1/2)	Praxapostolos	6–7 (majuscule)
Pan. 128 (*Diktyon* 33773)	Binding	8	Parakletike	13	Lectionary of the Gospels	9 (majuscule)

Tab. 1: Palimpsest manuscripts in the holdings of the Patriarchal Library in Istanbul

In total, this amounts to 720 palimpsest folios in ten different manuscripts for the collection of the Holy Trinity[32] and only 16 palimpsest folios in two different manuscripts for the Panagia. All of the manuscripts were reused between the end of the 12th century and the middle of the 15th century, with a peak between the end of the 13th and the middle of the 14th century, which is consistent with the period generally observed for the use of palimpsested parchment by Greek scribes in Byzantium and Southern Italy. The upper layer contains exclusively liturgical or patristic material. The lower layers of the palimpsest folios range in date between the 9th and the 13th century, half of the folios being in majuscule writing, and, except for the *Book of Ceremonies*, they all contain liturgical, hagiographic, or patristic texts. According to palaeographical observation, none of them can be ascribed a Southern Italian origin, and only one of them could possibly have a Palestinian origin. In this way, the library of the Patriarchate offers a good sample of the use of palimpsested parchment at the heart of the Byzantine Empire.

Metrophanes: a Collector of Palimpsests?

The proportion of palimpsests in the collection of manuscripts that come from the Monastery of the Holy Trinity, approximately 7% (10 manuscripts with palimpsest portions out of 147), is unusually high compared to what is usually found in collections of Greek manuscripts, where the proportion tends to be around 1 or 2%,[33]

[32] Trin. 102 has a total of 297 folios (ff. II.296 [+ 215a, -34, 181]). In most cases, however, one reused parchment folio of the older manuscript was folded in two and forms a bifolio of the current manuscript, so there are actually only 161 folios from the older manuscripts; see below p. 294.

[33] The figures of palimpsest manuscripts in collections of Greek manuscripts were made available in a census conducted in many European Libraries for the Rinascimento virtuale programme in the early 2000s. Many of the results of this survey were published in the collective volume *Libri palinsesti greci*, edited by Santo Lucà: Athens, Ἐθνικὴ Βιβλιοθήκη τῆς Ἑλλάδος: less than 1% (23 palimpsests out of more than 3,000 mss), see Melissakis, Οἱ Παλίμπσηστοι. Paris, Bibliothèque nationale de France: approximately 1.2% (57 palimpsests identified at the end of the 19th century by Alfred Jacob, out of more than 4,500 Greek mss), see Mondrain, La réutilisation, 116. Vienna, Österreichische Nationalbibliothek: 2% (21 palimpsests out of 1,065 Greek mss), see Grusková, *Untersuchungen*, 22. Cambridge, University Library: 2.6% (5 palimpsests out of 191 Greek mss), see Tchernetska, Hand-List

sometimes a little more, especially in Italian libraries with manuscripts from Southern Italy, where the use of palimpsested parchment was more common.[34]

The figures for the Monastery of the Holy Trinity can be usefully compared with the situation at the twin Monastery of the Panagia on the same island of Halki, which was refounded approximately at the same period—even if such statistics must be used, of course, with extreme caution.[35] In the case of the Panagia the proportion of palimpsests is barely 1% (two manuscripts with palimpsest portions out of a total of 178 manuscripts), and, indeed, much less if one considers the number of pages. And yet, the two collections were built up at approximately the same period, between the 16th century and the first half of the 17th century, on the same island on the outskirts of Constantinople, at that time capital of the Ottoman Empire. How is it that the library of the Holy Trinity has such a high proportion of palimpsest manuscripts? Is it just chance, or could it be that palimpsests aroused the curiosity of Metrophanes, as they do ours today?

The difference in the proportion of palimpsests must evidently be placed alongside the number of parchment manuscripts and the date of the manuscripts. The proportion of manuscripts mainly made of parchment in the collection of the Holy Trinity is again unusually high: close to half of the codices are parchment, while three quarters of the Panagia collection are composed of paper manuscripts.[36] The same can be said for the age of the manuscripts: more than 80% of the manuscripts at Holy Trinity are pre-15th century, and the great majority are from the 11th–14th centuries,[37] while almost half of the manuscripts of the Panagia were copied from the 16th century onwards.

All of these figures confirm the general impression that Metrophanes was a well-informed bibliophile who collected carefully-chosen pieces of value for the library of the monastery he refounded—mostly old manuscripts, which he could find on the Constantinopolitan market and in the monasteries he frequented, especially the Great Lavra on Mount Athos. Regarding palimpsests, Metrophanes certainly had no idea of the undertexts and he was probably just lucky in his choice of manuscripts. His collection may also reflect the fact that the phenomenon was actually more widespread in late Byzantium than we think today. To illustrate this, it is worth going back to one century before the time of Metrophanes, to the period immediately preceding the Fall of Constantinople, and turn to one specific palimpsest, one of his lucky choices, and present it more in detail.

MS. TRIN. 102: A MANUSCRIPT COPIED AT THE MONASTERY OF THE PANTOKRATOR IN CONSTANTINOPLE

The manuscript Trin. 102 is, as has already been mentioned, a Panegyrikon for the whole year. It was copied in its entirety by a single scribe, Stephanos the deacon, in a monastery dedicated to the Pantokrator, in the year 1435, as is stated in the colophon in dodecasyllable verses on the last page of the manuscript (f. 296v):[38]

(the figures are much higher if one takes into account the palimpsests with an upper layer in other languages). Naples, Biblioteca Nazionale Vittorio Emanuele III: 1.1% (5 palimpsests out of 439 mss), see Formentin, Palinsesti ... Napoli, 155. Venice, Biblioteca Nazionale Marciana: 0.8% (10 palimpsests out of 1,234 mss), see Formentin, Palinsesti ... Napoli, 159, and Ead., I palinsesti … Marciana, 146. Florence, Biblioteca Medicea Laurenziana: 2.6% (31 palimpsests out of 1,201 mss), see Magrini, I palinsesti. Vatican City, Biblioteca Apostolica Vaticana: 2.9% (139 palimpsests out of more than 4,700 Greek mss), see Canart, Les palimpsestes. Milano, Biblioteca Ambrosiana: 4.1% (45 palimpsests out of 1,093 mss), see Pasini, I palinsesti (but he also takes into account manuscripts with upper layers in other languages than Greek).

[34] This is true in particular for the Biblioteca Apostolica Vaticana and the Biblioteca Ambrosiana (see previous footnote), but also for libraries of Southern Italy—for example, Messina, Biblioteca Universitaria: 14.6% (with 29 palimpsests out of 198 mss, see Rodriquez, I palinsesti), and naturally the Library of Grottaferrata.

[35] It is very difficult to determine the precise physiognomy of the collection of the Holy Trinity at the time of Metrophanes. Moreover, many manuscripts have been withdrawn from the collection and now are found in different collections. Other manuscripts arrived after the Patriarch's time. The same can be said for the Library of the Monastery of the Panagia, which benefited in 1629–1630 from the arrival of a large number of manuscripts from the Monastery of the Prodromos of Sozopolis: see Kouroupou and Géhin, *Catalogue*, I, 15–16.

[36] Holy Trinity (147 mss): 43% parchment (63 mss); 57% paper (84 mss) – Panagia (178 mss): 28% parchment (49 mss); 72% paper (128 mss); and one mixed parchment/paper (Pan. 78). If we compare the proportion of manuscripts with palimpsest portions to the total number of parchment manuscripts, the Holy Trinity (16%) is again far ahead of the Panagia (4%).

[37] Holy Trinity: 15th and before: 86% (122 mss), 16th and after: 14% (20 mss); Panagia: 15th and before: 57% (97 mss), 16th and after: 43% (74 mss).

[38] See Binggeli *et al.*, *Catalogue*, I, 281, and II, pl. 208. The epigram was also edited recently by Vassis, Das Pantokratorkloster, 248–249.

† ἐνταῦθα τέρμα βϊβλί́ου, (καὶ) τ(οῦ) βΐ́(ου),
τ(οῦ) ὁσϊομάρτϋρος στεφάνου νέου·
ἐν τῆ παντοκράτορος γραφέντων μάνδρα·
τάλανος χειρΐ́, στεφάνου δϊακόνου·
εἰς ἐξίλασμα τῶν αὐτοῦ ὀφλημ<ά>τ(ων) :
μϊ(νὶ) φε<βρουα>ρ<ίῳ>· (ἰνδικτιῶνος) ιγ(ης) τῶ ςϡμγ(ω) ἔτει :-

Here ends the book, as well as the Life of the holy martyr Stephen the Younger, that were written in the mandra of the Pantokrator, by the miserable hand of Stephen the deacon, as a propitiatory offering for his debts, in the month of February, 13th indiction, of the year 6943.

The main problem with this colophon lies in the identification of the monastery dedicated to the Pantokrator. It could be the Constantinopolitan monastery founded in the 12th century by John II Komnenos, the Athonite monastery founded in the 14th century—or even, for that matter, any other monastery dedicated to the Almighty. To our knowledge, the scribe, Stephen the deacon, is not known from any other manuscript, but a closer look at the contents of the manuscript allows us to make some assumptions about the place and the circumstances in which it was copied.

The manuscript contains a sequence of 13 texts ordered according to the liturgical year,[39] from the *Oratio in Seraphim* by John Chrysostom, to be read for the feast of the Archangels on 8 November, to the *Oratio in decollationem s. Iohannis* by the same John Chrysostom, to be read on the feast of the Beheading of John the Baptist on 29 August. The other texts in the manuscript are readings for the Sunday of the Ancestors of Christ (before Christmas), St. Philogonos on 20 December (five days before Christmas), St. Theodore Stratelates and St. Luke the Younger on 8 February, St. Martinianos on 13 February, St. Blasios of Sebaste on 11 February, St. George on 23 April, St. Arsenios on 8 May, the feast of the Transfiguration on 6 August, and the feast of the Dormition of the Theotokos on 15 August.

After this series, one last text was copied at the end of the manuscript: the metaphrastic *Life of St. Stephen the Younger*. According to the liturgical rubric, it is to be read on the feast of the saint on 28 November, and thus does not follow the order of the calendar. However, the copy of this text seems to have been included in the scribe's initial project, since he already announced his intention to copy it in a note at the end of the first text, the *Oratio in Seraphim* (f. 8ᵛ), deciding to relegate it to the end of the manuscript, as some kind of personal vow:[40]

Ζήτ<ει> νοε<μβ>ρΐ́<ου> κη΄ ἐν τῶ τέλ<ει> τοῦ βϊβλί́ου, λόγον τ(οῦ) βίου (καὶ) τῶν ἀγών(ων) τ(οῦ) | ὁσϊωτάτ(ου) ὁμολογητ(οῦ) στεφάνου· (οὐ) δϊὰ λήθ(ην) ἐκεῖσε γραφέντα ἀλλὰ | δϊ᾽ αἰτίαν ἑτέραν· ὑμεῖς δὲ οἱ ἐντϋγχάνοντ(ες) τούτω, δότε μοι τῶ ραθΰμω σϋγγνώμ(ην) | πρὸς χ(ριστο)ῦ παντοκράτ(ο)ρος.

Look at the end of the book for November 28th, the homily of the life and deeds of the very holy confessor Stephen; it was not written there by forgetfulness, but for another reason. You who read this, give forgiveness to me, the careless, towards Christ Pantokrator.

We would have liked the scribe to specify what this 'other reason' was. The homonymy between the scribe and the last-celebrated saint in the manuscript is certainly one explanation, and as a monk himself, he may have considered Stephen the Younger as his patron saint and therefore wanted to put a special emphasis on this text, both by placing it in a conspicuous place at the end of the manuscript and by naming it explicitly in the colophon.[41]

Another explanation for the special status of this last text may lie in the fact that a relic of St. Stephen the Younger was preserved precisely at the Monastery of the Pantokrator in Constantinople in the 15th century. A Russian pilgrim, Zosima the Deacon, who visited the monastery in 1419–1422, records having seen there

[39] See a detailed description of the content in Binggeli *et al.*, *Catalogue*, I, 278–279.

[40] Even if the note, in red ink, may have been added after the manuscript was finished, a blank space for the note was provided for from the start on f. 8ᵛ. The *Life of St. Stephen the Younger* is also included as the last item in the *pinax* that was added by Stephen the deacon at the beginning of the codex (f. IIᵛ).

[41] The metaphrastic version of the *Life of St. Stephen the Younger* (*BHG* 1667), which is included in this manuscript, makes no allusion at all to the author of the pre-metaphrastic version of this *Life* (*BHG* 1666), who is also called Stephen the deacon. It is certainly a coincidence that both the scribe and the author of the pre-metaphrastic *Life* have an identical name.

the hand of St. Stephen the Younger, a relic which is also attested in the contemporary account of an Armenian pilgrim and may have been a recent acquisition, since previous pilgrims do not mention it.[42] In any case, St. Stephen the Younger seems to have enjoyed particular veneration in the Constantinopolitan Monastery of the Pantokrator in the first half of the 15th century.

According to the Typikon of the Pantokrator in Constantinople, which dates to the 12th century, the two main feasts celebrated in the monastery were the feasts of the Transfiguration (6 August), as the principal festival of the *katholikon*, and the Dormition of the Theotokos (15 August), probably in honour of the Theotokos Eleousa, to whom the second church of the monastery was dedicated.[43] It is to be noted here again that both feasts are disproportionately well represented in the Panegyrikon, with two homilies devoted to each, while the other major Marian or Dominical feasts are absent. The monastery had a third funerary chapel dedicated to the Archangel Michael, which could also explain the presence of the homily for the feast of the Archangels at the beginning of the codex.[44]

This Panegyrikon could thus reflect a desire to assemble a volume specially designed for the commemorations celebrated at the Constantinopolitan monastery in its heyday.[45] The Monastery of the Pantokrator was indeed an important establishment in Constantinople during the 14th and 15th centuries, until the Fall of the City, and served in particular as an imperial burial place for the Palaiologan dynasty.[46] In the early 1420s, sometime between 1422 and 1425, Makarios Makres was appointed hegoumenos of the monastery by the emperor John VIII Palaiolologos, and he remained in that post until his death in 1431. In the performance of his duties, he contributed to the restoration of the monastery, with the help of his friend George Sphrantzes, and increased the monastic community from six to twelve monks.[47] In the same years, George Scholarios, the future Patriarch of Constantinople, lived in the monastery as a layman, and composed in particular three poems on the tomb of his friend the hegoumenos Makarios.[48] So there is no difficulty in placing the copy of our palimpsest in this context, at the Pantokrator in Constantinople, for the use of the flourishing monastic community, perhaps under the successor of Makarios, the hegoumenos Gerontios, who is attested between 1437 and 1445.[49] However, despite the presence of such figures and the signs of political and intellectual activity at the monastery, it must be noted that no manuscripts, except for our palimpsest, can actually be attributed to the Pantokrator in Constantinople in the 14th and 15th centuries.[50]

Using Palimpsested Parchment in 15th-Century Constantinople

At this point it is worth considering more closely the use of palimpsested parchment in late Byzantium. The phenomenon of palimpsestation has been studied extensively for Southern Italy, and it has been shown that the use of this material covers a period from the end of the 12th century to the 15th century, the most numerous

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42 See Majeska, *Russian Travelers*, 186 and 295, and Mineva, References to the Monastery of the Pantokrator, 85.

43 See Kotzabassi, Feasts, 154–156.

44 Kotzabassi, Feasts, 156, mentions no feast days in this church, but the evidence is based on the 12th century Typikon.

45 It must be noted, conversely, that the Panegyrikon does not contain any text for the commemoration of St. Floros and St. Lauros, whose relics were among the most important found in the Monastery of the Pantokrator in Constantinople and were venerated by many Russian pilgrims, and that none of the other feasts that are commemorated in the Panegyrikon can be directly related to the specific liturgical calendar of that monastery.

46 See Janin, *Les églises et les monastères*, 515–523. On the history of the monastery during this period, see Kotzabassi, The Monastery of Pantokrator. See also Melvani, The Patriarchate, 178.

47 See Gautier, Le typikon, 24; Argyriou, *Macaire Makrès*, 6–7; Kotzabassi, The Monastery of Pantokrator, 64–65.

48 See Argyriou, *Macaire Makrès*, 6–7; Kotzabassi, The Monastery of Pantokrator, 65.

49 On Gerontios, who took part in the Council of Ferrara-Florence in 1438–1439, see, for example, Kotzabassi, The Monastery of Pantokrator, 65.

50 All the 14th century manuscripts cited by Janin, *Les églises et les monastères*, 521 (Vatican City, BAV, Vat. gr. 555, 813, 816, 864) come in fact from the Athonite Monastery of the Pantokrator; see Melissakis, Ἡ βιβλιοθήκη, 291–292. Only Sinai gr. 339, copied by the 12th century abbot Joseph Hagioglykerites, can certainly be ascribed to the Constantinopolitan Pantokrator; see Gautier, Le typikon, 22. Another manuscript that could possibly come from the Constantinopolitan Pantokrator is Vienna, ÖNB, med. gr. 26, a medical miscellany of the first half of the 15th century that bears a possession note of a Pantokrator monastery (f. 444v): Τουτο το βηβλίο ηνε του παντοκρατορα. It was bought in Constantinople by Ogier Ghislain de Busbecq during his stay in the Ottoman capital between 1554 and 1562; see Hunger and Kresten, *Katalog*, 73. I thank Marie Cronier for this reference.

records being from the 13th and the first half of the 14th centuries. It has often been considered as a phenomenon restricted to 'peripheral regions', and no comprehensive surveys have been made for the use of palimpsested parchment in Constantinople in the 15th century.[51] And yet, a great number of known examples of the use of this material come precisely from Constantinople and its hinterland in the first half of the 15th century, just before the Fall of the City.[52]

The most famous example is that of George Baiophoros, whose copying activity spans the period from 1402 and 1434.[53] During the early period of his scribal activity, at least during the years 1402–1407, he copied luxury manuscripts on paper, many of them for rich sponsors.[54] During the second period of his scribal activity, from 1418 to 1434, Baiophoros focused almost exclusively on copying the *Schedographia* and *Erotemata* of Manuel Moschopoulos for scholarly use, mainly on palimpsested parchment. Twenty-one manuscripts of these two works, and possibly one manuscript of the *Grammatica* of Gennadios Scholarios using palimpsested parchment, have been identified, out of the 39 manuscripts where he is the principal copyist.[55] According to the conclusions of Ernst Gamillscheg and Annaclara Cataldi Palau, Baiophoros was then working at the Monastery of the Prodromos of Petra, so the very wide range of texts found in the lower layers of the reused parchment came from the rich library of that monastery and is a sign of the intellectual activity that had prevailed there.

Another scribe of the 15th century who used palimpsested parchment in the region of Constantinople is John Chortasmenos, who also began his career at the Prodromos of Petra. After 1425, he became bishop of Selymbria, on the outskirts of Constantinople. There, for the liturgical needs of his episcopal church, he copied two volumes of the Menaion (London, BL, Add. 31,919 and 36,823) on palimpsest parchment, the first of which is dated to the year 1431.[56] One year earlier, in the colophon of another volume of the Menaion that he signed in 1430—this time on paper (Oxford, Christ Church, 56)—Chortasmenos gave a list of ten liturgical manuscripts that he copied himself (ἅπερ οἰκειοχείρως γέγραφα) and dedicated to the same episcopal church of Selymbria. Out of these, nine were on parchment (an Oktoechos in two volumes, five volumes of the Menaion, an Euchologion, and a Lectionary of the Gospels).[57] Most probably all of these volumes, which have not yet been identified, were written on reused palimpsested parchment, just like the two preserved volumes of the British Library. New parchment was indeed very rare in 15th-century Constantinople, and was used exclusively for luxury manuscripts copied for Western—mainly Italian—sponsors, like Francesco Filelfo and Giovanni Aurispa. These manuscript hunters may possibly have taken with them their own stock of new parchment specifically for the purpose of having manuscripts copied for them during their stay in Constantinople.[58] In 1431, again probably for his episcopal church of Selymbria, Chortasmenos also restored a manuscript of the *Homiliae in Matthaeum* of John Chrysostom (Vatican City, BAV, Vat. gr. 2126), by using several folios of palimpsested parchment (ff. 20–23, 338); he also used new parchment for two folios (ff. 337 and 339), but it was of very poor quality[59] and could in no way compare to the parchment used for the Italian sponsors.

Another example of the use of palimpsested parchment in Constantinople is the famous codex Vatican City, BAV, Vat. gr. 1298, a 10th-century exemplar of the works of Aelius Aristides. A large portion of the manuscript was restored at the beginning of the 15th century in a Constantinopolitan *atelier*, perhaps related to emperor

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[51] See however, Mondrain, La réutilisation.

[52] Studies have been made of the use of palimpsested parchment in Southern Italy; see for example Crisci, *I Palinsesti di Grottaferrata*, 261–264, who considers that peripheral regions offer more favourable conditions than the capital for the use of palimpsest parchment.

[53] On George Baiophoros, see Gamillscheg, Zur handschriftlichen Überlieferung, and Cataldi Palau, Un nuovo manoscritto palinsesto.

[54] See Cataldi Palau, Un nuovo manoscritto palinsesto, 286, and charts, 289–291. His earliest dated manuscript (London, BL, Add. 11,892–11,893) is a two volume *Suda* copied in 1402 on paper.

[55] See Cataldi Palau, Un nuovo manoscritto palinsesto, 289–291.

[56] See Mondrain, La réutilisation, 115.

[57] Gamillscheg, Die Handschriftenliste, 147.

[58] On the use of parchment in Constantinople at the beginning of the 15th century, see De Gregorio, L'Erodoto, 53–62, with a tentative list of manuscripts containing classical texts copied on parchment in the second and third decades of the 15th century by scribes like George Chrysokkokes, Stephanos of Medeia and George Dokeianos, many of them for Francesco Filelfo, who took them back to Italy before 1427. To the manuscripts cited in De Gregorio's article can be added London, BL, Add. 11,728 (Polybius), copied by Stephanos of Medeia in 1416, and Florence, BML, Conv. Soppr. 180 (Plato), copied by the same Stephanos of Medeia. See also Cataldi Palau, I Colleghi.

[59] Schreiner, Johannes Chortasmenos.

Manuel II Palaiologos, using palimpsested parchment taken from no fewer than six different manuscripts.[60]

These are just a few examples that suggest that the use of palimpsested parchment in Constantinople in the decades before the Fall of the City was not a marginal practice, while, by contrast, it was not used in the Athonite monasteries at this time as far as can be judged.[61] All of this confirms that our palimpsest, Trin. 102, was indeed copied in the Monastery of the Pantokrator in Constantinople in the decades before the Fall of the City. Nevertheless, unlike the palimpsest manuscripts copied by Baiophoros and Chortasmenos, who in most cases reuse fragments from a large number of different manuscripts,[62] the manuscript copied by Stephen the deacon at the Pantokrator reflects a very different practice.

The Making of the Palimpsest

The manuscript Trin. 102 is entirely palimpsest, including the fly-leaves. All the folios (ff. II.296 [+215a, -34, -81]), come from the same pre-metaphrastic Panegyrikon for the whole year, except for two folios that belong to odd manuscripts (ff. 114 and 281).[63] The underwriting of the manuscript first attracted the attention of Albert Ehrhard, who examined the manuscript in 1908 when it was is still in Halki; he deciphered a few folios and identified seven different texts.[64] My predecessor at the IRHT, Father Joseph Paramelle, had at his disposal a contrasted black and white printout of the set of photos made in 1962 by the Dumbarton Oaks American photographic mission; he identified almost half of the palimpsest folios and discovered eight more texts. In the process of cataloguing the manuscripts of the Holy Trinity, I pursued the deciphering of the palimpsest using the Dumbarton Oaks photos, and a few digital photos that were made in 2016 especially for the catalogue. I was able to identify the text contained in the lower layer of all the remaining folios (except one), and discovered another nine texts. The total number of texts that have been preserved from the original Panegyrikon thus amounts to 24 texts:[65]

Life of St. Symeon Stylites (1 Sept.)
Passion of St. Babylas (4 Sept.)
Cosmas Vestitor, *On Zacharias* I–II (5 Sept.)
Miracle of the archangel Michael at Chonai (6 Sept.)
Pantaleon the Deacon, *Miracles of the archangel Michael* (6 Sept.)
John Damascene, *On the Nativity of the Mother of God* (8 Sept.)
Life of St. Theodora of Alexandria (11 Sept.)
Andrew of Crete, *On the Holy Cross* (14 Sept.)
On the Fathers of the 6th Ecumenical Council (15 Sept.)
Passion of St. Euphemia (16 Sept.)
Passion of St. Eusthatios and St. Theopiste (20 Sept.)
Acts and miracles of St. Thecla (24 Sept.)
Acts of St. John the Evangelist (26 Sept.)
Life of St. Gregory the Illuminator (30 Sept.)
John Chrysostom, *On the Annunciation* (25 March)
Passion of St. Cyprian and St. Justina (2 Oct.)

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[60] Grosdidier de Matons and Förstel, Quelques manuscrits grecs.

[61] I thank Zisis Melissakis for this information.

[62] For Baiophoros, see a tentative list in Cataldi Palau, Un nuovo manoscritto palinsesto, 296–301. Detailed studies on individual manuscripts have also been made by different scholars. At least 23 different manuscripts were used for Milano, Biblioteca Ambrosiana, Q 6 sup. (see Turco, Il Palinsesto). 13 different manuscripts were used for Vienna, ÖNB, phil. gr. 286 (see Grusková, *Untersuchungen*, 103–131). Fragments from the same original palimpsested manuscript were also used by Baiophoros to copy different manuscripts: see for example Bianconi and Orsini, Libri e *membra disiecta*. However, some manuscripts copied by Baiophoros are made mainly of one single palimpsested manuscript, for example, Paris, BnF, gr. 2575 (Cataldi Palau, Un nuovo codice della 'collezione filosofica'), and Milano, Biblioteca Ambrosiana, L 9 sup. (Cataldi Palau, Un nuovo manoscritto palinsesto, 297).

[63] F. 281 is a double palimpsest, with the Acts of Thomas in a round minuscule of the 10th century and a Menaion of the 12th century. F. 114 contains a hagiographical text.

[64] Ehrhard, *Überlieferung und Bestand*, I, 336–337. The manuscript is described there as a Menologion for the whole year; the collection should rather be considered as a 'Jahressammlung'.

[65] See precise description of the texts in Binggeli *et al*., *Catalogue*, I, 279–280.

Life of St. Pelagia (8 Oct.)
Life of St. Abramios and his niece Maria (19 Oct.)
Passion of St. Arethas of Najran (24 Oct.)
Passion of St. Barbara (4 Dec.)
Michael the Archimandrite, *Life of St. Nicholas of Myra* (6 Dec.)
John Chrysostom, *On the exile of Adam* (Sunday τῆς Τυροφάγου)
Life of St. Mary the Egyptian (1 April)
Anastasius of Sinai, *On Psalm 6* (First Sunday of Lent)

Fig. 1: Istanbul, Patriarchal Library, Trin. 102, ff. 50v–51r (© Istanbul, Patriarchal Library)

Eric Junod and Jean-Daniel Kaestli, who used this manuscript for their critical edition of the *Acts of St. John the Evangelist* published in 1983, showed that it is the only known witness that contains this particular version of the apocryphal text that is closest to the original.[66] In hagiographical manuscripts, when there is one rare text, generally there are some others. In several instances the Panegyrikon presents rare or unknown versions of hagiographical texts, with large portions that have no known parallel. Leaving the description of the contents for another contribution,[67] I would like to present here the codicological features of the original manuscript and examine the way the folios were reused by Stephanos the deacon.

In total, 159 folios from the original manuscript were reused, and although no quire marks have been preserved, it can be shown that these folios belong to 29 different quires of the original manuscript, all quater-

[66] See Junod and Kaestli, *Acta Iohannis*, 19–20.
[67] The texts contained in the palimpest Panegyrikon will be presented more at length in a forthcoming comprehensive study.

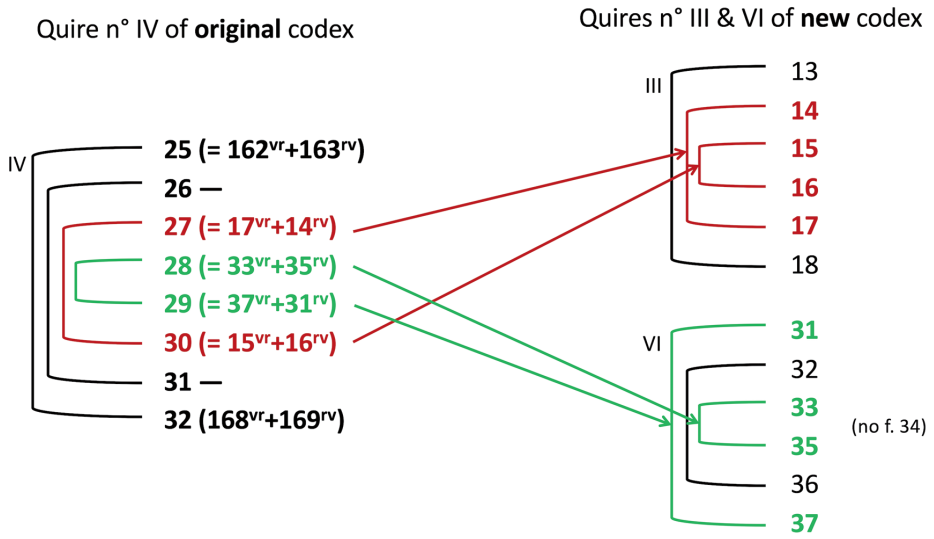
nions. As the original set of prickings are still visible on many folios,[68] the dimensions of a folio of the original codex can be reconstructed: it measured approximately 380 × 280 mm. The text is written in two columns of 38 lines, for a written surface of 280 × 80 mm per column, in a very neat *Perlschrift* of the 11th century. The decoration, although no colour is preserved, is related to the *Laubsäge-Ornamentik*. It is thus a monumental codex of high quality that must have counted originally at least 300 folios.

One of the puzzling features that can be observed is that in preparing the leaves of the original manuscript for the production of the new manuscript, four different methods were used:

1. In most cases (133 folios), one single leaf of the original codex was folded into a bifolio for the new codex. The original folio is turned by 90° and the underwriting is perpendicular to the upper writing.
2. In 10 cases, the original folio has been cut in half widthwise, and only the upper (or lower) half has been reused (17 to 22 lines of text). The original half-folio is turned by 90° and forms a single folio (with its stub) of the new codex; the underwriting is perpendicular to the upper writing.
3. In 14 cases, the original folio was trimmed on two sides to form one single folio (with its stub) of the new codex; only one column and a half of the original folio are preserved, with 30 out of 38 lines. In this case, the lower and upper handwriting are superimposed, even if the lower handwriting appears sometimes at 180 degrees in relation to the overtext.
4. Bifolio 50–51 presents a particular case: it is an original bifolio (and not a folio) that was trimmed in the same way, on two sides, to form a bifolio of the new manuscript. Three columns of the original text are thus preserved. The fold of the bifolio and the notches for the sewing 'à la grecque' are clearly visible in the middle of f. 50 (see Fig. 1).

Why were the original folios subjected to different treatments when reused in the new manuscript? The way the folios were folded or trimmed probably depended on the state of the palimpsested folio. When it was possible, the original folio, which served as the modular template for the new manuscript, was just folded in two to create a bifolio, but if part of the original folio was in a bad state or had been damaged while being rubbed, it was then cut accordingly in order to discard the damaged part. Such a preparation implies however that the 15th century scribe had at his disposal the complete folios, or even bifolios, and that he then cut them on the spot according to his needs.

Following up on an idea that was presented by Jost Gippert in his publications concerning the Sinai Albanian palimpsest,[69] it can be observed that in our manuscript, the bifolios of the original codex are not distributed completely at random in the new codex. Both parts of the original bifolio were usually kept close together and were used one after the other in the pile. Here is an example from quire IV of the original codex:



Tab. 2: Diagram representing the redistribution in the new codex of folios from quire IV of the original codex

[68] See in particular ff. 95/96.
[69] Gippert, The Albanian Gospel Manuscript, 59–60.

The third bifolio of the original codex (27/30) was cut in two halves to create two bifolios for the new codex that were directly superimposed in quire III. The two halves of the central bifolio (28/29) were reused in the same quire (VI), although not directly superimposed.[70] The two parts of the external bifolio (25/32) were used in two consecutive quires (XXVI and XVII). Finally, when one half of the original bifolio is missing in the new codex, generally the other part will also be missing (here 26/31). This way of reusing bifolios from the original codex in the new codex can be observed, if not systematically, nevertheless fairly regularly. This codicological 'rule' proved naturally very helpful in identifying the text contained in the lower layer on heavily erased folios, where only two or three words could be read. It was also useful in reconstructing the quire structure of the original manuscript. The fact that the two parts of a bifolio are found close together in the new manuscript again gives the impression that the scribe had at his disposal the complete bifolios, and that he cut them and superimposed them himself, or at least that it was done in the same general process by which the book was produced.

CONCLUSION

While the Prodromos of Petra in Constantinople—like St. Catherine's on Mount Sinai—seems to have had some kind of 'waste paper bin' full of discarded bits and pieces of palimpsested manuscripts, which were used at random by scribes like George Baiophoros, it is not certain that there was such a waste paper bin full of ready-to-use forgotten treasures at the Pantokrator, where Stephen the deacon was working during approximately the same period. One entire manuscript that offered plentiful raw material was systematically dismembered and reused in the same process in order to copy this new manuscript (MS. Trin. 102), and probably a number of other manuscripts yet to be found in order to fill in the missing parts. The palimpsested manuscript was an outdated monumental Panegyrikon, and it must have seemed appropriate to replace it with a new Panegyrikon specially conceived for the feasts celebrated in the Monastery of the Pantokrator for which the manuscript was copied.

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[70] In quire VI of the new codex there is no f. 34.

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Andreas Janke

Challenges in Working with Music Palimpsests

Many European medieval parchment manuscripts with musical notation survive only in damaged condition, often fragmented and reused by later bookbinders as pastedowns or flyleaves. Among these sources, there is a relatively small group of manuscripts whose musical contents have been erased and overwritten. This essay aims to draw attention to this specific group of insufficiently-studied manuscripts that warrant greater attention from musicologists and imaging experts. Although individual palimpsests have been studied intensively in the past, there is still no comprehensive palimpsest research within musicology that investigates the fundamental phenomena and circumstances of music palimpsests. Therefore, all available parchment manuscripts containing such palimpsests are included in this article, regardless of the type of notation (from adiastematic neumes to mensural notation), the language (usually Latin, French, or Italian), the genre, and the context of origin and use (liturgical as well as secular compositions).

Due to its generally delicate notation, palimpsested music poses specific challenges that must be considered by researchers, especially when working with different methods of recovering lost writing. A key part of this essay's contribution is the Appendix, a list assembling a group of fifty-seven music palimpsests of various origins, most of which would benefit significantly from state-of-the-art imaging techniques. The Appendix is arranged according to the manuscripts' current locations, and each manuscript has been numbered for ease of reference. I will refer to the manuscripts by these numbers throughout.

I use the term 'music palimpsest' for all instances in which music notation has been erased with the intention of subsequent overwriting. Most manuscript sources contain vocal music and its associated texts (sacred or secular, sometimes both in the same manuscript). The process of writing that text beneath the notes is called text underlay,[1] not to be confused with other possible texts, especially those in the later overwriting. I have not considered minor corrections that were essential parts of the original writing process; such erasures have been discussed in detail by John Haines, who has observed that these are not usually longer than one verse.[2] Also not discussed here are palimpsests with music written over non-musical content.

Almost nothing is yet known about the palimpsesting techniques that were applied to the parchment manuscripts under discussion here. At first consideration it appears that, in most cases, the original contents were more likely to be scraped than washed off, as the first method is the more economical and does not require restretching of the parchment leaves.[3] Some manuscripts show clear evidence of heavy scraping of the complete original writing space (e.g. no. 10), while others show no signs of scraping and therefore may have been washed off before the new text was entered (e.g. no. 26).

The music palimpsests collected in the Appendix contain erased lower scripts originating from the 9th to 15th centuries, and thus include some of the earliest European examples of musical notation. It is possible that the number of palimpsested music manuscripts declined as the use of paper for manuscripts increased in the 15th century. The upper scripts date mainly from the 12th to the 17th centuries. The contexts in which these manuscripts were palimpsested differ considerably. Liturgical manuscripts generally had a much longer life span than collections of secular polyphony, for example. In the former case, manuscripts could be in use for very long periods of time (200 years, for example, would not be unusual); in the latter, however, a manuscript's contents would be considered outdated after only thirty or forty years.[4] Much time, however, might pass before the

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1 This does not necessarily imply that the music was written first.

2 Haines, Erasures in Thirteenth-Century Music.

3 Brown, Palimpsested Texts in Beneventan Script, 105 n. 20.

4 Wathey, The Production of Books, 144–145.

discarded manuscripts finally wound up in the pile of *libri inutiles* from which parchment could be selected for reuse by scribes or bookbinders.[5] In most cases, only parts of previously extensive manuscripts have been reused in new manuscripts (e.g. nos. 2, 6, 7, 26, 35, 36, 47, and, more extensively, no. 43). Some palimpsests were created using leaves from multiple sources, though not necessarily from music manuscripts. On rare occasions a complete manuscript seems to have been newly created from the material of a single codex (e.g. nos. 10 and 38).

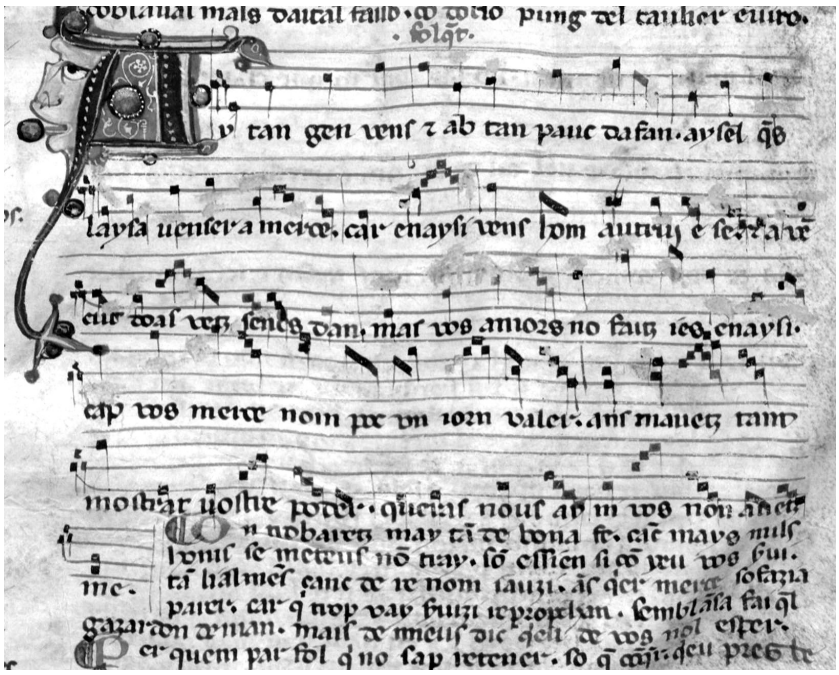

Fig. 1: Paris, Bibliothèque nationale de France, fr. 22543, Chansonnier La Vallière, (no. 32), f. 43r, monophonic song *Ay tan gen vens* (© Paris, Bibliothèque nationale de France)

There are numerous instances of manuscripts with palimpsested music continuing to serve musical functions. The smallest intervention is the replacement of selected parts such as the melody (no. 34), the underlaid text, or a complete voice part, e.g. the contratenor (no. 24). Figure 1 shows the replacement of a melody in a 13th-century chansonnier in which the text was left intact.[6] Due to changing tastes it is possible that, in song collections, complete compositions—usually occupying a single page or opening—were replaced by more up-to-date pieces. In other manuscripts, more substantial changes can be seen, such as the replacement of all the notation (e.g. no. 13). This means that the same melodies were written over those that had been erased, but using a different notational system. This type of endeavour might sometimes also require readjustment of the text underlay (e.g. no. 29).[7]

In several cases, initials were not erased but, rather, incorporated into the new musical contents.[8] In the *Nivelle Chansonnier* (no. 39) ten folios were erased but the initials were left intact (Fig. 2). Although none of these folios have been overwritten, there was surely the intention to do so, since those initials not erased permit the assumption that the new musical content had already been planned. Otherwise, if the music had merely been intended for deletion, it would have been easier to simply cross it out or label it with 'vacat', as is seen in other manuscripts. In the *Lucca codex* (no. 19) the ballata *Donna liçadra* by Bartolino da Padova (ca. 1365–1405) was overwritten with the more modern French song *Dueil angoisseux*, by Gilles Binchois (ca. 1400–1460), making reuse of the initial 'D' for both the cantus and tenor parts. A more systematic approach to reusing initials can be found in manuscript Egerton 274 (no. 17), in which eleven French chansons were replaced with

[5] See Powitz, *Libri Inutiles*.
[6] On this see Aubrey, *The Music of the Troubadours*, 47.
[7] See Stinson, The Rimini Antiphonal, 70.
[8] This phenomenon is also known from other, non-musical, instances of reuse. See Powitz, *Libri Inutiles*, 298.

Latin responsories, reusing the original golden or blue initials (in most cases, both text underlay and music were replaced, in some only the text underlay). A huge parchment leaf housed in New Haven (no. 28), presents a different case: a historiated initial 'S' was left intact after erasure of the chant *Sacerdos et pontifex* in the 16th century. The newly inserted chant *Intret in conspectu tuo* does not match with the lavish initial—it seems to have been more important to keep the illumination within the initial than to erase it to fit the new chant.

All music palimpsests bear witness to various transformations that include changes in musical tastes and writing systems, as well as more significant influences, such as church reforms with their impact on music in the liturgy. The regional Beneventan chant and its notation, for example, was suppressed by Pope Stephen IX in 1058, which led to replacement of many liturgical manuscripts—or their contents (e.g. no. 3).[9] Other palimpsests (e.g. no. 29) can be connected to the Council of Trent (1545–1563).

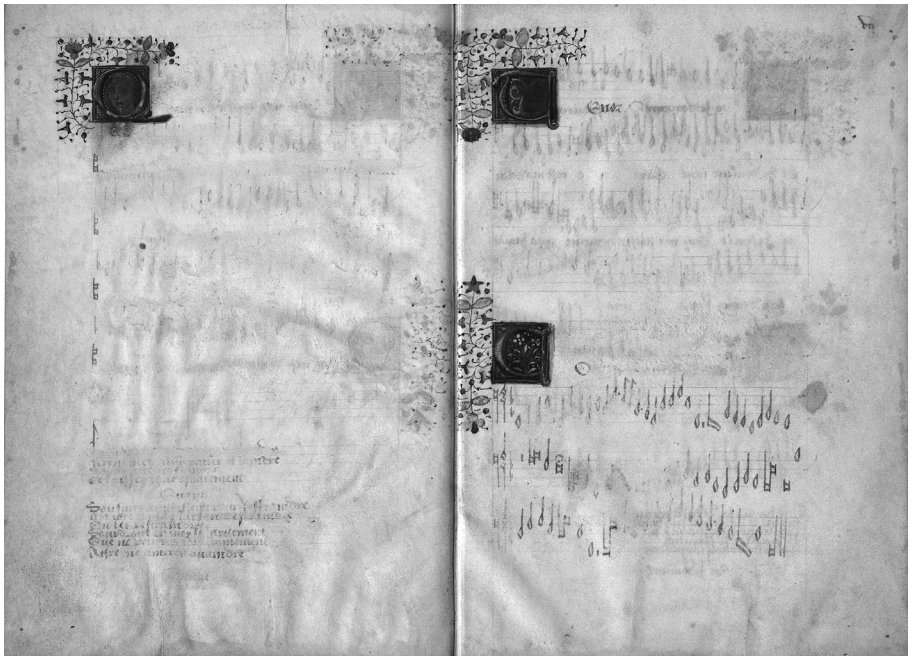

Fig. 2: Paris, Bibliothèque nationale de France, Rés. Mus. Vmc. 57, *Nivelle Chansonnier* (no. 39), ff. 6v–7r. Cantus and tenor parts have been scraped, the contratenor part only partially. All initials have been left intact (© Paris, Bibliothèque nationale de France)

TECHNIQUES FOR REVEALING ERASED MUSIC

When 19th-century scholars made use of various chemicals to recover lost writing, they did not omit music palimpsests. This is attested to, for example, in a manuscript from Turin (no. 43), which was subjected to such treatment.[10] In the early 20th century, the Benedictine monk Raphael Kögel, recognizing the danger of such practices, began photographing palimpsests with ultraviolet (UV) light.[11] This technical advance was also applied to music palimpsests, primarily liturgical books with musical notation. This is the case, for example, with a manuscript in Darmstadt (no. 7), of which the first UV photographs were taken in 1920 at the Institut für Palimpsestphotographie at Beuron in Bavaria, by the director, Alban Dold.[12] Another early example is a manuscript from Karlsruhe (no. 13), in which only the notation was erased, and then rewritten using a more up-to-date notational system. In this instance, Kögel provided the scholar Karl Hain with images, and Hain

[9] See Kelly, *Beneventan Chant*. For additional examples of Beneventan palimpsests see Brown, Palimpsested Texts in Beneventan Script.

[10] Scappaticci, Codici Musicali Palinsesti, 134.

[11] Easton and Kelbe, Statistical Processing of Spectral Imagery, 36.

[12] Dold, *Palimpsest-Studien*, vol. 1, 73ff.

published two of Kögel's images in 1925.[13] Since then fluorescence generated under UV illumination has been the primary tool used to enhance readability of the underwriting in music palimpsests, incorporating ongoing improvements in cameras, lenses, and light sources.[14]

In 2006 the Digital Image Archive of Medieval Music (DIAMM) created a practical *Digital Restoration Workbook*[15] that instructs scholars in digitally manipulating images taken under visible light using software such as Adobe Photoshop. As a result, scholars today may manipulate digital restorations on their own when investigating manuscripts that are difficult to read.[16] Fig. 3 shows one of my own attempts at applying digital restoration to an important palimpsest that contains ten folios from a late 9th- or early 10th-century notated chant book, probably of French origin: Munich, Bayerische Staatsbibliothek, clm 14735, ff. 9–28.[17] Each of the ten folios was turned 90 degrees and reused as a bifolio when it was overwritten in the 13th century with a Latin text. The basis for creating the enhanced image in Fig. 3 was a standard 300 DPI colour image provided by the Bayerische Staatsbibliothek in Munich. The resulting image allows us to recognise the lower script written perpendicular to the upper script. It also provides a sense of the neumatic notation and the text underlay. Since this manuscript is one of the earliest surviving witnesses to this kind of notation, it is my hope that, in the near future, images with much higher resolution will be available, or that multispectral images of the ten leaves can be created.

Fig. 3: Munich, Bayerische Staatsbibliothek, clm 14735 (no. 24), f. 19r, (A) before and (B) after digital restoration; and (C) detail, turned 90 degrees clockwise (© Munich, Bayerische Staatsbibliothek and Andreas Janke)

[13] Hain, *Ein Musikalischer Palimpsest*, plate XXXIII.

[14] See, for example, the UV images in Nádas and Ziino, *The Lucca Codex*.

[15] Craig-McFeely and Lock, *Digital Restoration Workbook*.

[16] Published examples of enhancements of music palimpsests can be found in Memelsdorff, New Music in the Codex Faenza; Memelsdorff, *The Codex Faenza 117*; and Catalunya and Gutiérrez, Mozarabic *Preces*.

[17] I thank Susan Rankin for bringing this manuscript to my attention. She is interested in this manuscript within the scope of her research on early medieval music books and notation: see Rankin, *Writing Sounds*.

For almost two decades, multispectral imaging (MSI) and the creation of pseudocolour images have been used in different disciplines to recover palimpsests.[18] The first successful application of such techniques to a music palimpsest, however, was attempted only recently, in 2013, by scholars and scientists at the University of Hamburg.[19] The manuscript in question is the San Lorenzo Palimpsest (no. 10), an important early-15th-century Florentine collection of secular polyphonic music that includes, in its present state, 216 compositions, written on 111 palimpsested folios.[20] Since the discovery of its musical underwriting in the early 1980s,[21] repeated attempts had been made to recover some of the underwriting, using UV light.[22]

This manuscript, now entitled 'Campione de' Beni del 1504', served the administration of the church of San Lorenzo in Florence from the 16th century. A document from the church, dated 22 November 1482, attests to the decision to create this 'Campione de' Beni'. Unfortunately, exactly when the music was erased from the parchment cannot be deduced from this document. At some point, the folios were added to a pile of *libri inutiles*; at this institution erased parchment folios were also used for other, similar, administrative books. While some of these manuscripts consist of parchment taken from assorted manuscripts, the 'Campione de' Beni del 1504' was created using exclusively parchment from the 15th-century music collection. Some of the original gatherings of five bifolios each remained intact and, except for one folio that was turned upside down, the writing direction of the lower script and the overwriting is the same.

Unfortunately for us, the parchment was extremely well scraped, to such an extent that it is today quite thin, with many holes. It seems that the person who erased the music began with the very first page, which is the most heavily scraped and difficult to read, even as a pseudocolour image. Early on, the person scraping the parchment seemed to perform the task assiduously, but fortunately his enthusiasm waned as the work went on.

After imaging the full manuscript on-site in Florence in 2013 with a portable MSI system, different workflows were tested for recovery of the lost writing. To address the difficulties of the frequent heavy scraping and other problems, such as the similarity of the inks in both layers of writing, it turned out that the best results could be achieved by applying Principal Component Analysis or Independent Component Analysis. Even then, in many cases only one of the resulting output bands was suitable for creating pseudocolour images. Therefore, the band with the best representation of the underwriting was used twice in the creation of the pseudocolour images (red and green channels). To achieve a significant contrast between the two writing layers the 455 nm

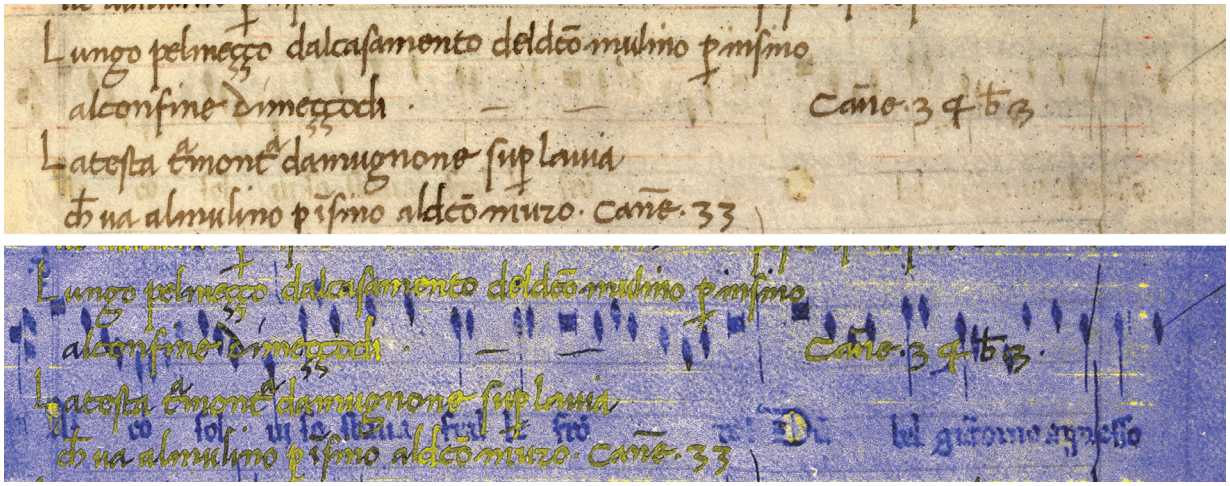

Fig. 4: Florence, Archivio del Capitolo di San Lorenzo, 2211, San Lorenzo Palimpsest (no. 10), detail of f. 20r as the manuscript appears today, and below a pseudocolour image from the same page that reveals the tenor part of Giovanni da Cascia's madrigal *Nascoso el viso* (© Florence, Archivio del Capitolo di San Lorenzo and Hamburg, Centre for the Study of Manuscript Cultures)

[18] See for example Christens-Barry *et al*., Imaging and Image-Processing Techniques.

[19] The workflow has been described in Janke and MacDonald, Multispectral Imaging. Multispectral imaging could also be applied to other damaged music manuscripts; see, for example, Janke *et al.*, The Atri Fragment.

[20] There are seventy-nine folios missing from the original music manuscript. See Janke and Nádas, *The San Lorenzo Palimpsest*, vol. 1, 7.

[21] D'Accone, Una Nuova Fonte; Nádas, Manuscript San Lorenzo 2211.

[22] See Janke and Nádas, *The San Lorenzo Palimpsest*, vol. 1, 1–2.

blue reflectance image was inserted into the blue channel (see Fig. 4).[23] All images were published in 2016,[24] together with transcriptions of several previously unknown compositions.[25]

In addition to the techniques detailed here, there are others available that may be relevant to future work with music palimpsests: a) tracing, using high-resolution digital images[26] and b) hyperspectral imaging (although multispectral imaging seems to be more suitable for music palimpsests).[27]

CHALLENGES

Scholars working with music palimpsests face particular difficulties, three of which are: lacunae, the recovery of red ink, and a phenomenon that could be called 'artificial dittography'. Such complications are among the reasons why a recovered palimpsest cannot be treated as a facsimile.

The various types of music notations in use from the 9th through 15th centuries have in common a large number of significant elements, such as dots and thin lines, that disappear easily during the scraping process and are therefore difficult to recover. Such delicate elements can also be hidden below the overwriting, because, typically, it is not possible to recover elements that are obscured directly by overwriting, especially when the inks of both layers respond in similar ways when exposed to different light sources.[28] This is particularly problematic, for example, when dealing with polyphony from the 14th and 15th centuries. In such cases, the exact rhythm can be transcribed only when all notational signs are recognizable, as they work contextually with one another. Therefore, if one sign—or even parts of that sign—is obscured, the rhythmic values of the surrounding notes are difficult to determine.

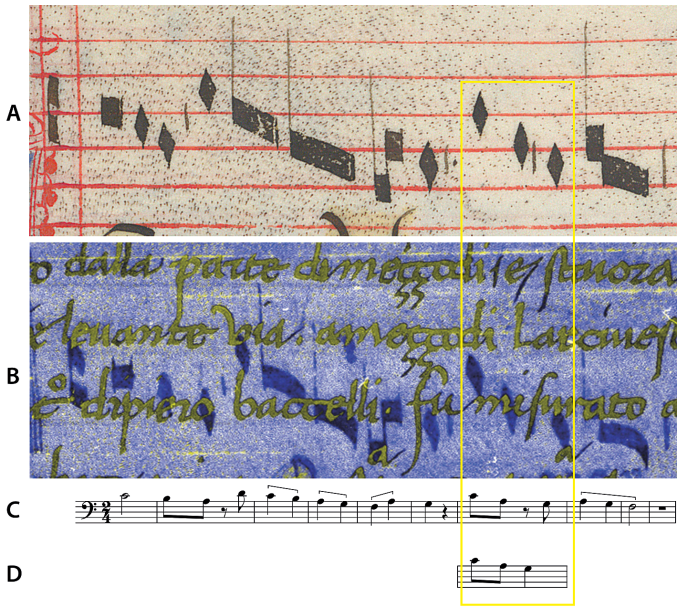

Fig. 5: *Oselletto selvagio*, caccia by Jacopo da Bologna (fl. 1340–1360). (A) *Squarcialupi Codex*, f. 13v [reproduced by permission of the Ministero della cultura, any further reproduction by any means whatsover is prohibited]; (B) San Lorenzo Palimpsest, f. 26r (orig. Roman foliation), pseudocolour image; (C) and (D), transcriptions in modern notation (© Florence, Biblioteca Medicea Laurenziana, Florence, Archivio del Capitolo di San Lorenzo, and Hamburg, Centre for the Study of Manuscript Cultures).

[23] Janke and MacDonald, Multispectral Imaging, 117–119.

[24] Janke and Nádas 2016, *The San Lorenzo Palimpsest*; all pseudocolour images are reproduced in the original manuscript order in vol. 2. This publication is available in open access: http://doi.org/10.25592/uhhfdm.8637 (accessed 01.07.2023).

[25] Janke, *Die Kompositionen*, 187–225.

[26] Rafiyenko, Tracing.

[27] A study by Alexander J. Zawacki, Kyle Ann Huskin, Helen Davis, Tania Kleynhans, David Messinger, and Gregory Heyworth, which is currently being prepared, will compare both techniques using a music palimpsest not yet listed here. I thank the authors for sharing a draft of their text with me. The title of the forthcoming article is *Fragments Under the Lens: A Case Study of Multispectral Versus Hyperspectral Imaging for Manuscript Recovery*.

[28] In the San Lorenzo Palimpsest, for example, both script layers presumably contain iron gall ink.

The subparts of Figure 5 serve to demonstrate this: Figure 5(A) is the beginning of the tenor from the caccia *Oselletto selvagio* by Jacopo da Bologna (fl. 1340–1360), taken from the early-15th-century Florentine manuscript known as the *Squarcialupi Codex* (Florence, Biblioteca Medicea Laurenziana, Med. Pal. 87, f. 13v). Figure 5(B) gives the same melody, this time taken from the San Lorenzo Palimpsest (f. 26r, original foliation), here as a pseudocolour image. The yellow frame highlights a grouping that, in the *Squarcialupi Codex*, consists clearly of three rhombus-shaped notes (semibreves) and a vertical line representing a rest. This rest is obscured in the palimpsest behind the letter 's' of the overwritten word 'misurato'. Being able to relate the overwriting to the underwriting helps an editor to understand contextually if a sign might be obscured or not.[29] Therefore it would not make sense, in such cases, to try and camouflage the overwriting by digitally manipulating its colour to match that of the parchment background, for example.[30] The transcription from the *Squarcialupi Codex* (Fig. 5[A]) can be seen in Figure 5(C). If the *lacuna* in the palimpsest is not made obvious by separating under- and overwriting, one might transcribe this passage differently, as in Figure 5(D). In this example the concordant reading in the *Squarcialupi Codex* helps the editor to better understand what might be concealed in the palimpsest. In other cases, however, in which a palimpsest is the only source of a composition, separating the different layers of writing from one another is necessary so that the editor can weigh the possibilities. There are limits, however, to how much the different layers can be separated, particularly when similar inks were used in all layers. In the pseudocolour images of the San Lorenzo Palimpsest, the underwriting usually appears dark blue and the primary overwriting in yellow (see Fig. 4 and 5).

Red ink plays a significant role in most music manuscripts. In the case of the San Lorenzo Palimpsest, the following elements were written in red: composer attributions in the top margin, foliation numbers, notational signs for expressing specific rhythmic values, and stave lines. Unfortunately red inks, such as cinnabar and red lead, are difficult to recover with MSI because organic fluorescence blockers—such as tannins that would block the fluorescence of the parchment—are missing; see, for example, the stave lines in the pseudocolour images in Figures 4 and 5, which appear yellow in the MSI, though large sections are barely visible.[31] For this reason, when MSI is applied to palimpsests, the focus is usually on recovering iron gall inks. Portions of the underwriting that appear to be in red ink should always be compared with the original manuscript or images taken under visible light, as the red ink might be displayed differently in different pseudocolour images.[32]

So far, my focus has been on difficulties caused by the palimpsest nature of the manuscripts. There are, however, cases in which particularly good pseudocolour images might lead to confusion during the editing process. Since erasure is a fundamental part of writing down music[33] it is possible that, through MSI, a note is revealed that the original scribe had already erased. One such possible example may exist in the San Lorenzo Palimpsest, in which a note had most likely been misplaced, erased, and then rewritten on the same stave line, but a bit further to the right and hence in its correct position.[34] When both notes are recovered, one must recognize that this is not the repetition of a specific pitch but, rather, the result of image processing, an example of what I have dubbed 'artificial dittography'.

Despite these challenges, there are many benefits to be gained from paying greater attention to music palimpsests in the future. Recovering a palimpsest is, in a way, finding a new music manuscript. Not only new concordances and variant readings, but even previously unknown music can be investigated, transcribed, and, finally, performed again.[35]

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[29] In Fig. 5(A) there is a dot of division immediately in front of the yellow frame that was not entered in (B); no overwriting obscures the expected position.

[30] This problem has been discussed in Christens-Barry *et al*., Imaging and Image-Processing Techniques, in the context of the Archimedes Palimpsest, 180. On this topic regarding the San Lorenzo Palimpsest, see Janke and MacDonald, Multispectral Imaging, 117; and Janke and Nádas, *The San Lorenzo Palimpsest*, vol. 1, 11.

[31] I thank my colleague Ivan Shevchuk for more detailed information on this topic.

[32] See Janke and MacDonald, Multispectral Imaging, 121; Janke and Nádas, *The San Lorenzo Palimpsest,* vol. 1, 11–12.

[33] See Haines, Erasures in Thirteenth-Century Music, 66.

[34] Janke, *Die Kompositionen*, 50. In this case the folio was not overwritten.

[35] Previously unknown music from the San Lorenzo Palimpsest has recently been recorded by the Ensemble La Morra: *Splendor da ciel* (Ramée, 2018).

APPENDIX

The following list presents a summary of select manuscripts with palimpsested music. It should not, however, be considered 'complete', as many palimpsests are not recognised as such in catalogues and it is probable that others still await discovery. The accompanying information has been kept to a minimum and is intended to summarize the general relationship between the under- and overwriting. The sizes of the manuscripts have been given whenever possible; this is important information when planning future imaging campaigns. In the process of compiling the list I made use of the following repositories and databases:

- Census-Catalogue of Manuscript Sources of Polyphonic Music 1400–1550;[36]
- Digital Image Archive of Medieval Music;[37]
- Medieval Music Manuscripts Online Database;[38] and
- Répertoire International des Sources Musicales.[39]

Byzantine and Greek music palimpsests are not included; they have already been catalogued by Neil Moran.[40] For Beneventan liturgical manuscripts with palimpsested music see the work done by Virginia Brown.[41] I have not repeated her nos. 5, 7–8, 11, 24, 27, 31, 36, 38, 40, 47, 52, 57, 65, 69–71, 73, 75, 79, 81, 83, 85, 92–94, or 104.

* * *

1. APT, Cathédrale Ste Anne, Trésor 16 bis (*Apt Codex*), 45 ff. (270 × 193, and 290 × 210 mm)
   14th–15th-cent. collection of polyphonic settings for the Mass.
   Lower script: f. 11v, Sanctus 'Mediolano'.

2. ASSISI, Biblioteca del Sacro Convento, 574, 90 ff. (220 × 145 mm)
   12th cent., collection of different texts beginning with *De septem gradibus animae*.
   Lower script: appears on many folios (musical notation at least on ff. 60r–61r, 66r, 72v, 79r–v, and 83r–90v) from an 11th-cent. Gradual with adiastematic neumes from Northeastern Italy. Some of the reused ff. have been turned upside down.

3. BARI, Archivio del Duomo, Exultet roll 2[42]
   13th cent., Vulgate text of the Exultet and the Roman melody in square notation.
   Lower script: dates from the 11th cent. and includes Beneventan text and notation.

4. BUDAPEST, Egyetemi Könyvtar, A. 107, 69 ff. (542 × 360 mm)
   15th and 16th cents., liturgical manuscript with square notation, copied in Hungary.
   Lower script: contains polyphonic Lessons on ff. 42r–62v and f. 68r–v.

5. BURGOS, Monasterio de las Huelgas (Codex Las Huelgas), 170 ff. (260 × 180 mm)
   ca. 1325, music manuscript containing polyphony.
   Lower script: on f. 20v, not identified.[43]

6. COLOGNY, Fondation Martin Bodmer, Cod. Bodmer 177, 109 ff. (237 × 164 mm)
   12th cent. (early), Northern Italy, containing a medical handbook by Gariopontus of Salerno.
   Lower script: from two manuscripts, one of them an 11th-cent. Antiphonary from Nonantola with neumes (f. 42v).

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[36] *Census-Catalogue of Manuscript Sources of Polyphonic Music 1400–1550*.
[37] https://www.diamm.ac.uk/ (accessed 01.07.2023).
[38] http://musmed.eu (accessed 01.07.2023).
[39] *Répertoire International des Sources Musicales*, B/IV.
[40] Moran, A List of Greek Music Palimpsests. See also Alexandru, The Palaeography of Byzantine Music.
[41] Brown, Palimpsested Texts in Beneventan Script.
[42] Kelly, *The Beneventan Chant*, 299.
[43] Lütolf, *Die Mehrstimmigen Ordinarium Missae-Sätze,* vol. 2, 230.

7. DARMSTADT, Universitäts- und Landesbibliothek, 749[44]
   12th cent. (second half), multiple-text manuscript.
   Lower script: written perpendicular to the upper script, 28 ff. of an Antiphoner (9th cent.) with neumes.

8. DORCHESTER, Dorset Record Office, Bridport 2069, 40 ff., now lost
   14th cent., list of names connected to the church of St. Andrew of Brudeport.
   Lower script: as reported, a two-part composition on f. 7 of the manuscript (which is now lost) was overwritten probably by the end of the 14th cent.

9. FAENZA, Biblioteca Comunale Manfrediana, 117 (*Faenza Codex*), 96 ff. (245 × 175 mm)[45]
   ca. 1410–1420, Northern Italy, keyboard intabulations (first layer) and polyphonic settings and treatises on music theory added by the Carmelite friar Johannes Bonadies, ca. 1473–1474.
   Lower script: Bonadies erased the keyboard intabulations on ff. 26r–v and 62r–v to make room for treatises. Pedro Memelsdorff provided digital restorations for all folios except f. 26r.

10. FLORENCE, Archivio del Capitolo di San Lorenzo, 2211 (San Lorenzo Palimpsest), 111 ff. (285 × 200 mm)[46]
    1504, *Campione dei Beni* of the Church of San Lorenzo in Florence; work on this volume began at the end of the 15th cent.
    Lower script: appears on all 111 ff. from a collection of at least 216 secular two- and three-part polyphonic pieces compiled around 1410–1420. Multispectral images of all folios were taken in 2013, processed, and published as pseudocolour images in 2016 (http://doi.org/10.25592/uhhfdm.8637).

11. FLORENCE, Archivio del Capitolo di San Lorenzo, ASLii15, 278 ff.[47]
    Late 14th cent. to early 18th cent., liturgical manuscript (Sanctoral Gradual) with square notation.
    There is a considerable amount of palimpsestation in this manuscript, intended to expand on its original repertory and create a compilation of post-Tridentine Mass Ordinaries and Propers.[48]

12. FLORENCE, Archivio del Capitolo di San Lorenzo, ASLiii16[49]
    Liturgical manuscript (Invitatorium and Hymnal) with square and mensural notation.
    Lower script: hymns on ff. 37–80, the original texts for the hymns on ff. 37–81 were removed and new texts copied to adhere to the changes mandated by Pope Urban VIII in his 1632 reform of the Roman Breviary.[50]

13. KARLSRUHE, Badische Landesbibliothek, Augiensis perg. 60, 276 ff. (334 × 229 mm)[51]
    ca. 1165–1175, Antiphonary.
    In the 13th/14th cents. the notation (diastematic neumes) was erased and overwritten with gothic notation; the 12th-cent. text underlay has been left intact.[52]

14. LONDON, British Library, Add. 29987, 88 ff. (260 × 195 mm)[53]
    15th cent., collection of mostly secular polyphony. However, it is likely that this manuscript also contained sacred music in its first part, which is now missing.
    Lower script: today's f. 1r contained a polyphonic Credo that was overpainted with a Medici family coat of arms. Opinions differ as to whether the overpainting dates to the 15th cent. or much later.

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[44] Rankin, On the Treatment of Pitch, 173, 175.
[45] Memelsdorff, New Music in the Codex Faenza; *The Codex Faenza 117*, 82.
[46] Janke and Nádas, *The San Lorenzo Palimpsest*.
[47] Stinson, The Early Liturgical Books, esp. 142. and 145–146.
[48] *Ibid*.
[49] *Ibid*., esp. 138f.
[50] *Ibid*.
[51] Hain, *Ein musikalischer Palimpsest*.
[52] Early enhancements using UV light by Raphael Kögel were published in Hain, *Ein musikalischer Palimpsest*.
[53] Di Bacco, Alcune nuove osservazioni; Gozzi, Alcune Postille.

15. LONDON, British Library, Add. 57,950 (*Old Hall Manuscript*), 112 ff. (416 × 276 mm)[54]
14th–15th cents., collection of polyphonic Mass settings
Erasure of text underlay on f. 69v, and complete erasure of the Agnus Dei on ff. 101v–102 (leaving one initial intact on f. 101v), probably for the insertion of another Agnus Dei.[55]

16. LONDON, British Library, Harley 2945, 171 ff. (187 × 130 mm)[56]
15th cent., Sarum processional.
In the 16th cent. some melodies were replaced with void notation on ff. 65–70.

17. LONDON, British Museum, Egerton 274, 160 ff. (150 × 107 mm)
13th cent., Trouvère chansonnier.
Lower script: partially over-written in the 15th cent., especially on ff. 98r–118v: for eleven of eighteen French chansons the first strophes have been erased and overwritten with Latin responsories. In most cases music and text underlay were replaced; in some, text underlay only. The initials remain intact.

18. LONDON, Lambeth Palace, 457, 254 ff., paper and parchment (195 × 133 mm)[57]
Mid-13th cent., composite manuscript.
Polyphonic music only on f. 192, of which the verso side has been erased (continuation of Agnus Dei trope from f. 192r and an unidentified piece) and overwritten in the later 13th cent. with notes on the seven deadly sins.

19. LUCCA, Archivio di Stato, 184 and Perugia, Biblioteca Comunale 'Augusta', 3065, twenty-five bifolios from a dismembered codex (220 × 160 mm)[58]
15th cent. (first decades), collection of Italian and French songs.
Lower script: ff. 20v–21r, French song (*Dueil angoisseux* by Gilles Binchois) was written over an erased Italian song (*Donna liçadra* by Bartolino da Padova).[59]

20. MANTUA, Biblioteca Comunale R. Ardigò, 32 (A. II. 1), 123 ff. (205 × 130 mm)[60]
12th cent., collection of assorted texts, e.g. Ivo Charnotensis, *Epistolae LXXV*.
Lower script: a 12th-cent. Antiphonary with diastematic neumes on ff. 105–123.

21. MANTUA, Biblioteca Comunale R. Ardigò, 287 (C. I. 25), 130 ff. (167 × 109 mm)[61]
12th cent., Hieronymus, *Hebraicae quaestiones. Liber de nominibus hebraicis*.
Lower script: 11th-cent. Antiphonary.

22. MANTUA, Biblioteca Comunale R. Ardigò, 295, 136 ff. (175 × 117 mm)[62]
12th or 13th cent., *Sermones praedicabiles* and other texts.
Lower script: 11th-cent. Antiphonary on ff. 97–104.

23. MANTUA, Biblioteca Comunale R. Ardigò, 331, 92 ff. (260 × 170 mm)[63]
11th cent., *Expositio missae* and other texts, the front flyleaf stems from a 13th-cent. notated Breviary.
Lower script: on the flyleaf, from a contemporary Antiphonary.

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[54] Bent, *The Old Hall Manuscript*.
[55] See *ibid.*, for a detailed discussion on the many different types of erasures in this manuscript.
[56] Rankin, Shrewsbury School, Manuscript VI.
[57] Summers and Lefferts, *English Thirteenth-Century Polyphony*, 23
[58] Nádas and Ziino *The Lucca Codex*, 118–119.
[59] Ultraviolet images have been published: *ibid.*, 210–211.
[60] Varelli, Liturgia e Musica a Polirone, 179.
[61] *Ibid*., 183.
[62] *Ibid*., 183–184.
[63] *Ibid*., 185.

24. MODENA, Biblioteca Estense Universitaria α.M.5.24, 52 ff. (278 × 200 mm)[64]
ca. 1420–1430, collection of sacred and secular polyphony.
Lower script: on f. 16r is a motet that is also copied on f. 50v. On f. 23r, the textless contratenor of Matteo da Perugia's *Gloria* has been replaced but the initial 'C' and the designation of the voice have been left intact.

25. MONTSERRAT, Biblioteca del Monestir, 1519 (Mundó 17), fragment, (151 × 55 mm)[65]
14th cent. (first half), Ars Nova notation on the hair side.
Lower script: on the hair side contains plainchant.[66]

26. MUNICH, Bayerische Staatsbibliothek, clm 14735, 51 ff.[67]
13th cent., composite manuscript.
Lower script: on ff. 9r–28v—written perpendicular to the upper script—from a late 9th- or early 10th-century chant book with adiastematic neumes. Single folios from the chant book have been folded and reused as bifolios for the present manuscript. A digital restoration of f. 19r appears in Fig. 3 of this essay.

27. NEW HAVEN, Yale University, Beinecke Rare Book and Manuscript Library, Marston 8, 76 ff. (195 × 135 mm)
ca. 1450, *Rhetorica ad Herennium* (Ps.-Cicero).
Lower script: parchment reused from various manuscripts including a large liturgical book with musical notation.

28. NEW HAVEN, Yale University, Beinecke Rare Book and Manuscript Library, 794, Fragment, 1 f. (923 × 625 mm)[68]
Leaf from a 16th-cent. Gradual with the chant *Intret in conspectu tuo*.
Lower script: *Sacerdos et pontifex*, from a 15th-cent. Antiphonary. The original historiated initial, the letter 'S', has not been altered.

29. NEW SOUTH WALES, State Library, Richardson 273 (*Rimini Antiphonal*), 155 ff.[69]
1328, Franciscan Common of the saints.
Forty folios were overwritten with texts and altered melodies after 1582 (in accordance with post-Tridentine practice).

30. NUREMBERG, Stadtbibliothek, Fragm. lat. 9a, flyleaves, 2 ff. (305 × 407 and 27 × 403 mm)[70]
14th cent. (second half), remnants of a collection of polyphonic music, Mass settings, and secular pieces.
Lower script: f. Dv contains Antonio Zacara da Teramo's *Credo* 'Cursor', written over another Credo.

31. OXFORD, Bodleian Library, Lat. Liturgy. d. 20, fragments[71]
13th cent., sacred Polyphony.
Lower script: polyphonic music on at least 23r; 24v; 25r; 26v; 28v, 34r, 34v, and 35r–v.

32. OXFORD, Bodleian Library, Bodl. 384, 358 ff. (275 × 182 mm)
13th-cent. manuscript with a collection of sermons, and late 14th-cent. polyphony (settings for the Mass Ordinary) on the flyleaves, ff. i–iii, which were added in the 15th cent. as part of a new binding.
Lower script: The music on ff. iiv–iiiv was erased and overwritten with text in the 15th cent.

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64 Stone, *The Manuscript Modena*, 116–119.
65 Catalunya and Gutiérrez, Mozarabic *Preces*.
66 A digital restoration has been published: *ibid*, 159.
67 Rankin, On the Treatment of Pitch, 173ff.; Rankin, *Writing Sounds*, 111 and 152.
68 Candelaria, Tropes for the Ordinary, 604.
69 Stinson, The Rimini Antiphonal.
70 Cuthbert, The Nuremberg and Melk Fragments, 19–22.
71 Lefferts and Summers, *English Thirteenth-Century Polyphony*, 37–38.

33. OXFORD, Corpus Christi College, 144, XX ff. (252 × 175 mm)
15th cent., composite manuscript, includes *Liber metricus de nova poetria* by Geoffrey of Vinsauf (on ff. 19r–43v).
Lower script on ff. 22r–29v, 14th-cent. (late) music with Ars Nova notation.[72]

34. PARIS, Bibliothèque nationale de France, fr. 22543, 148 ff. (430 × 305 mm)[73]
14th cent., Chansonnier provençal (Chansonnier La Vallière).
Lower script: on f. 43r, as discussed by Aubrey, the original melody of *Ay tan gens vens* was erased and replaced by a new melody (see Fig. 1).

35. PARIS, Bibliothèque nationale de France, gr. 2631 (*Palimpseste de Turin*), 195 ff. (250 × 170 mm)[74]
13th cent. (beginning), *Lexicon Etymologicum*.
Lower script: adiastematic neumes, ff. 136r–183v, 10th/11th cents., parts of a Gradual-Responsorial and an Antiphonary.

36. PARIS, Bibliothèque nationale de France, lat. 196, 153 ff. (195 × 135 mm)
Composite manuscript, primarily 12th-cent. texts.
Lower script: 11th-cent. Aquitanian notation, at least on ff. 40v and 42r.

37. PARIS, Bibliothèque nationale de France, lat. 1085, 112 ff. (225 × 95 mm)[75]
10th cent. (last quarter), Antiphonary with adiastematic Aquitanian neumes.
Lower script: on ff. 105–110, written perpendicular to the upper script, Processional with diastematic neumes.

38. PARIS, Bibliothèque nationale de France, lat. 7102, 219 ff. (180 × 120 mm)[76]
12th cent., medical treatises.
Lower script: 11th-cent. Gradual with adiastematic neumes, written perpendicular to the upper script.

39. PARIS, Bibliothèque nationale de France, Rés. Mus. Vmc. 57 (*Nivelle de la Chaussée Chansonnier*), 77 ff. (180 × 125 mm)[77]
15th cent., chansonnier.
Erasures with the intention of rewriting music on ff. 2v–3v, 6v–7r, and 49v–5.[78]

40. PRINCETON, Princeton University Library, Garrett 119, ff. 35r–36r (Fragment D)[79]
14th cent., Walter of Lille's *Alexandreis*.
Lower script: three unidentified settings in Franconian and Ars Nova notation.

41. ROCHESTER, University of Rochester, Eastman School of Music, Sibley Music Library, Vault ML96. M2942, 8 ff. (250 × 170 mm)[80]
16th cent., sacred music (plainchant and polyphony).
Lower script: 15th-cent. chansonnier, overwritten music on ff. 1v, 3v, 4r, and 8r–v.

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72 A digital restoration of f. 25v has been published in Craig-McFeely and Lock, *Digital Restoration Workbook*.
73 Aubrey, *The Music of the Troubadours*, 47; Nagy, Scratched-Out Notes, 18.
74 Cazaux-Kowalski, *Le Graduel-Responsorial-Antiphonaire Palimpseste de Turin*.
75 See description by Lila Collamore: http://cantus.uwaterloo.ca/source/123663 (accessed 01.07.2023).
76 Huglo, Le Graduel Palimpseste de Plaisance.
77 Nagy, Scratched-Out Notes.
78 UV images have been published: Higgins, *Chansonnier Nivelle de La Chaussée*.
79 Summers and Lefferts, *English Thirteenth-Century Polyphony*, 42.
80 Meconi, Shedding New Light.

42. SEVILLE, Biblioteca Capitular y Colombina, 5-2-25, 138 ff., paper and parchment (220 × 150 mm)[81]
Composite manuscript with material from Italian manuscripts principally from the 14th and 15th cents., for the most part containing treatises on music and notation.
Lower script: one bifolio (ff. 23/39) derives from a music manuscript, further study is required to identify any additional details. The overwriting on f. 23v is the table of incipits for a collection of polyphonic music.[82]

43. TURIN, Biblioteca Nazionale Universitaria, O.IV.20, 152 ff. (241 × 203 mm)[83]
15th cent., Domenico Cavalca's *L'Esposizione sopra il Credo*.
Lower script: contains the remnants of a 12th-cent. Gradual with diastematic neumes on ff. 18–19, 21, 23, 37, 41–42, 49, 56, 60–69, 75–76, 78–81, 86, 93–103, 105–135, 137–138, 141–142, 144, and 152.

44. TOURS (France), Bibliothèque Municipale, 925, 164 ff.[84]
15th cent., paper manuscript containing works by Terence.
Lower script: parchment folio 165r–v (flyleaf); motets, 13th/14th cents.

45. TRENT, Fondazione Biblioteca S. Bernardino, Incunabolo 60, flyleaf, 1 f.[85]
Early 15th cent., secular polyphonic music.
Lower script: earlier notated liturgical manuscript.

46. URBANA, University of Illinois at Urbana-Champaign, Rare Book and Manuscript Library, Pre-1650 MS 0118, 64 ff. (228 × 167 mm)
14th cent. (second half), *Doctrinale puerorum* by Alexander de Villedieu.
Lower script: liturgical manuscript with diastematic neumes.

47. VATICAN, Biblioteca Apostolica Vaticana, Pal. lat. 862, 108 ff.[86]
12th–15th cents., composite manuscript.
Lower script: 9th/10th-cent. Gradual with Nonantolan notation on ff. 68, 69, 71–2, 74–5, 77, 83, 91, and 102.

48. VATICAN, Biblioteca Apostolica Vaticana, Urb. lat. 602, 108 ff. (159 × 94 mm)[87]
11th/12th cents., Troper-Processional with Beneventan notation.
Lower script: in the 13th cent., many of the folios were erased and rewritten with Beneventan chant, e.g. ff. 13v–23v.

49. VATICAN, Biblioteca Apostolica Vaticana, Urb. lat. 677, 125 ff.
14th cent., texts by Boethius, Prosper Aquitanus, and Gualterus Anglicus.
Lower script: Beneventan notation, probably 12th cent., on at least ff. 93–97.

50. VATICAN, Biblioteca Apostolica Vaticana, Vat. lat. 4749, 112 ff. (327 × 239 mm)[88]
14th-cent. Antiphonary.
Lower script: on f. 15v, the Benedicamus Domino, *Flos filius* has been written down four times in different sizes and notations, partially covering each other.[89]

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81 Cuthbert, Palimpsests, Sketches, and Extracts.
82 This table was discussed by Michael Cuthbert in his unpublished paper 'Trecento Theory in Italian and Italian Theorists as Composers', presented at the Medieval and Renaissance Music Conference in Prague, 5 July 2017, and in Zimei 2018.
83 Scappaticci, Codici Musicali Palinsesti.
84 Summers and Lefferts, *English Thirteenth-Century Polyphony*, 41.
85 Cuthbert, *Trecento Fragments and Polyphony,* 214 fn. 163.
86 Rankin, *Writing Sounds*, 123, 152.
87 Boe, The 'Lost' Palimpsest Kyries; Kelly, *The Beneventan Chant*, 315.
88 Cuthbert, *Trecento Fragments and Polyphony*, 404–405.
89 For UV image and description, see *ibid*.

51. VATICAN, Biblioteca Apostolica Vaticana, Vat. lat. 9820[90]
    12th cent., Exultet roll with Vulgate text and Beneventan notation.
    Lower script: 10th cent. (late), Beneventan text and notation.

52. VATICAN, Biblioteca Apostolica Vaticana, Ott. lat. 576, 377 ff. (270 × 175 mm)[91]
    12th/13th cents., Missal with Beneventan script and diastematic neumes.
    Lower script: parts of two Missals on ff. 1 and 341–377.

53. VERONA, Biblioteca Capitolare, Cod. CIV (97), 32 ff.)[92]
    12th/13th cent., Evangelistarium Collectarium.
    Lower script: 11th-cent. Antiphonary, Nonantolan notation.

54. VIENNA, Österreichische Nationalbibliothek, Cod. slav. 141, fragment, 8 ff. (214 × 143 mm)
    14th cent., Psalter.
    Lower script: 12th cent., Sacramentarium, Antiphonary with Beneventan notation.

55. WIENHAUSEN, Klosterarchiv, MS 34a/34b[93]
    15th cent., notated liturgical manuscript.
    Lower script: on two bifolios designated as manuscript 34b: notated liturgical manuscript.

56. WORCESTER, Cathedral Library, Additional 68, Frag. xii, 1 f. (350 × 230 mm)[94]
    13th/14th cents., four incomplete polyphonic settings.
    Lower script: underwriting is (unidentified) music.

57. WORCESTER, Cathedral Library, Additional 68, Frag. xxix, 2 bifolios (215 × 142 and 220 × 150 mm)[95]
    13th cent., polyphonic and monophonic music.
    Lower script: on ff. b1r (only text underlay, no notation was entered) and b1v.

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[90] Kelly, *The Beneventan Chant*, 56 and 316.

[91] *Ibid.,* 314–315.

[92] Institut de recherche et d’histoire des textes (IRHT-CNRS), Notice de Verona, Biblioteca Capitolare, CIV (97), in: Baroffio, *Iter liturgicum italicum*, http://liturgicum.irht.cnrs.fr/manuscrit/625828 (accessed 01.07.2023).

[93] Hascher-Burger, Korrektur – Rasur – Palimpsest.

[94] Summers and Lefferts, *English Thirteenth-Century Polyphony,* 32.

[95] *Ibid.*, 33.

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Neue paläographische Einblicke in einige palimpsestierte Handschriften aus den griechischen Beständen der Österreichischen Nationalbibliothek*

Abstract: *New Palaeographical Insights into Selected Palimpsests from the Greek Manuscript Collection of the Austrian National Library*: The Austrian National Library in Vienna possesses a significant number of Greek palimpsests. Many of the lower texts were identified and the original manuscripts examined in the 1960s to 1990s, when the modern catalogue of Greek manuscripts was compiled. Other palimpsests were only studied in the past two decades, taking advantage of the digital recovery of erased writings. Since 2001, several projects have been conducted at the Austrian Academy of Sciences (Institute and then Department of Byzantine Research) in international co-operation. They have focused on deciphering, editing, and examining important Ancient Greek and Byzantine texts hidden in palimpsests as well as an in-depth palaeographical and codicological analysis. With the help of images derived from multispectral imaging and special image processing, the scholars have been able to decipher and study texts that had hitherto been partly or entirely invisible and to reconstruct the original manuscripts. This paper provides some recent insights into four unique Greek palimpsests of the Austrian National Library, with particular attention to palaeography: (1) fragments of *De prosodia catholica*, an important, but lost work on Greek accentuation by the 2nd-century CE grammarian Aelius Herodianus in Cod. Vind. hist. gr. 10; (2) the *Scythica Vindobonensia* in Cod. Vind. hist. gr. 73, new historical fragments on Gothic incursions into Roman provinces in the Balkans in the 3rd century CE, most likely parts of the lost *Scythica* by Dexippus; (3) a fragment of Eusebius' *Chronicle* (Book I) in Cod. Vind. iur. gr. 18; (4) a significant legal palimpsest of the *Basilica* in Cod. Vind. suppl. gr. 200.

EINLEITUNG

Die Bearbeitung eines palimpsestierten Handschriftenfragments[1] unterscheidet sich von der Bearbeitung anderer fragmentarisch erhaltener Handschriften dadurch, dass spezielle technische Mittel eingesetzt werden müssen, um die Schrift, und damit den zu erschließenden Text, wie auch die kodikologischen Merkmale der zu untersuchenden originalen Handschrift sichtbar zu machen. Allerdings lassen sich auch dann die durch die Tilgung reduzierten und durch den neuen Text teilweise überdeckten Einzelheiten dieser Handschrift zumeist nur innerhalb gewisser Grenzen erkennen. Eine korrekte Entzifferung der Buchstaben bzw. ihre Rekonstruktion (an jenen Stellen, an denen sie nur fragmentarisch sichtbar sind) müssen dabei aufgrund einer gründlichen paläographischen Untersuchung erfolgen (um alle Formen und Details der getilgten Schrift genau zu erfassen) und mit einer eingehenden philologischen Analyse verknüpft werden. Methodologisch konsequent umgesetzte Erkenntnisse der Paläographie und Kodikologie erlauben es ebenfalls, die originale Handschrift in einen chronologischen und kulturellen Kontext einzuordnen wie auch die Entstehungsumstände der neuen Handschrift zu beleuchten.

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* Im vorliegenden Beitrag haben Jana Grusková die Einleitung und die jeweiligen Bemerkungen zur Texterschließung und Forschungsgeschichte, d.h. Ia, IIa, IIIa und IVa, und Giuseppe De Gregorio die paläographischen Bemerkungen, d.h. Ib, IIb, IIIb und IVb, und den Epilog verfasst. Zu dem bei der Tagung vorgestellten ÖNB Fragm. gr. 2 wird eine eigene Studie von B. Stolte, G. De Gregorio und J. Grusková vorbereitet.

[1] D.h. einer fragmentarisch erhaltenen Handschrift, deren Blätter oder Blattteile nach der Tilgung des originalen Textes bei der Herstellung einer neuen Handschrift wiederverwendet wurden.

Unter den Beständen der Österreichischen Nationalbibliothek (ÖNB) in Wien befindet sich eine beachtliche Anzahl griechischer Palimpseste. Viele der in den unteren Schichten erhaltenen Handschriftenfragmente wurden bei der von Herbert Hunger, Otto Kresten, Christian Hannick und Wolfgang Lackner durchgeführten Gesamtkatalogisierung der griechischen Handschriftenbestände der ÖNB erfasst,[2] andere konnten erst im 21. Jahrhundert dank moderner technischer Möglichkeiten identifiziert und genauer untersucht werden.

Eine neue Phase der Bearbeitung der Wiener griechischen Palimpseste hat mit dem EU-Projekt „Rinascimento virtuale – Digitale Palimpsestforschung. Rediscovering written records of a hidden European cultural heritage“ (2001–2004) begonnen, an dem sich auf österreichischer Seite die Handschriften- und Nachlass-Sammlung (heute Sammlung von Handschriften und alten Drucken) der ÖNB unter der Leitung von Ernst Gamillscheg und die damalige Kommission für Byzantinistik (heute Abteilung Byzanzforschung [ABF] im Institut für Mittelalterforschung) der Österreichischen Akademie der Wissenschaften (ÖAW) unter der Leitung von Otto Kresten beteiligten.[3] Neben der Digitalisierung ausgewählter Palimpsestblätter mit einer speziellen, zur Lesbarmachung getilgter Schriften entwickelten Aufnahme-Technik (s. weiter unten) hat die ÖAW in den Jahren 2003–2004 eine Revision aller griechischen Palimpseste der ÖNB durchgeführt, mit der die Autorin dieser Zeilen, klassische Philologin mit Spezialisierung auf die Textüberlieferung antiker Literatur, beauftragt worden war. Im Anschluss daran setzte eine systematische Erschließung der Wiener griechischen Palimpseste ein, der seitdem mehrere an der Abteilung Byzanzforschung der ÖAW angesiedelte und zum großen Teil vom österreichischen Wissenschaftsfonds FWF geförderte Projekte gewidmet worden sind.[4] Diese Projekte wurden bzw. werden von Otto Kresten geleitet und von der Autorin dieser Zeilen in enger Zusammenarbeit mit Experten für die zu untersuchenden antiken und byzantinischen Autoren und Texte aus dem Bereich der Klassischen Philologie, Alten Geschichte, Rechtsgeschichte und Patristik durchgeführt. Ziel war und ist es, die originalen Handschriften gründlich zu untersuchen und die in ihnen überlieferten Texte von beachtlicher kultureller Bedeutung möglichst vollständig zu entziffern, kritisch zu edieren und genau zu erschließen. Zwecks einer möglichst genauen Beantwortung paläographischer Fragen wurden darüber hinaus Spezialisten für griechische Paläographie zur Kooperation eingeladen, woraus sich auch die im Folgenden präsentierten neuen paläographischen Beobachtungen von Giuseppe De Gregorio ergeben haben.

Bei einer Palimpsestuntersuchung am Original (z.B. im Lesesaal einer Handschriftensammlung) ist man auf die Hilfe einer UV-Lampe angewiesen. In Einzelfällen können darüber hinaus die für die Erschließung des getilgten Textes zuständigen Forscher (Philologen-Editoren mit den erforderlichen paläographischen Kenntnissen)[5] nach Erfüllung bestimmter konservatorischer Bedingungen und Sicherung der notwendigen finanziellen Förderung auf eine spezielle Digitalisierung („imaging“) und Bildverarbeitung („image processing“) in Kooperation mit spezialisierten technischen Teams zurückgreifen. Naturgemäß müssen sie dann neben ihren üblichen philologischen Aufgaben nicht wenige Stunden in eine gründliche Untersuchung der digitalen Aufnahmen investieren, um alle dort vorhandenen Informationen über die getilgte Schrift genau zu identifizieren und korrekt auszuwerten. Allerdings lassen sich nur sehr selten alle Teile eines getilgten Textes mit Hilfe einer einzigen Digitalisierung lesbar machen. Bei den meisten Palimpsesten müssen verschiedene Digitalisierungstechniken und diverse Methoden der speziellen Bildverarbeitung zum Einsatz kommen, womit sich die Bemühungen um eine möglichst komplette Entzifferung und Erschließung des Textes notgedrungen auf viele Jahre erstrecken.

Die moderne Aufnahmetechnik kam bei der Bearbeitung der griechischen Palimpseste der ÖNB zum ersten Mal im Jahre 2003 im Rahmen des EU-Projekts „Rinascimento virtuale“ zum Einsatz: Drei Palimpseste von

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[2] Siehe Hunger, *Katalog* I; Hunger und Kresten, *Katalog* II; Hunger und Kresten, *Katalog* III/1; Hunger, Kresten und Hannick, *Katalog* III/2; Hunger, Lackner und Hannick, *Katalog* III/3; Hunger und Hannick, *Katalog* IV.

[3] An dem genannten, von der Europäischen Kommission geförderten Projekt nahmen unter der Leitung der Universität Hamburg (Dieter Harlfinger) und von sechs anderen Hauptpartnern, darunter Österreich (vertreten durch Otto Kresten, ÖAW, und Ernst Gamillscheg, ÖNB), über 50 Institutionen aus 26 Ländern teil. Die Autorin dieser Zeilen hat die Slowakei (Comenius Universität Bratislava) vertreten. Zum Projekt vgl. vor allem Harlfinger, Grusková, Deckers und Vanhaegendoren (Hrsg.), *Rinascimento virtuale*; Escobar (Hrsg.), *Παλίμψηστος*; Lucà (Hrsg.), *Libri palinsesti greci*; Somers (Hrsg.), *Palimpsestes et éditions de textes*, und die Homepage unter http://www.rinascimentovirtuale.eu/ (abgerufen am 28.11.2020).

[4] Mehr dazu unter Ia, IIa, IIIa, IVa und bei Grusková, *Untersuchungen*, Einleitung; Grusková, Further Steps; siehe auch die Vorbemerkung von Otto Kresten in Grusková *et al.*, „Scythica Vindobonensia“, 69–73.

[5] D.h. jene Forscher, die für die Edition und die Erschließung des Textes wie auch für eine Rekonstruktion der originalen Handschrift zuständig sind.

besonderer kultureller Bedeutung (Cod. hist. gr. 10, ff. 1–33 [*Diktyon* 70887],[6] Cod. theol. gr. 160, ff. 1–4, 214–215 [*Diktyon* 71827],[7] und Cod. lat. 954, ff. 7–9, 14, 15 [*Diktyon* 70874][8]) wurden damals mit dem von Daniele Broia entwickelten speziellen Kamerasystem RE.CO.RD® der italienischen Firma Fotoscientifica aus Parma multispektral aufgenommen.[9] Die Digitalisierung wurde über die Kommission für Byzantinistik der ÖAW finanziert. In den Jahren 2005 und 2007 ließen Otto Kresten, der die Bearbeitung der Wiener griechischen Palimpseste leitete, und Jana Grusková (im Rahmen des ÖAW-Projekts „Griechische Palimpseste") einige weitere reskribierte Blätter in Zusammenarbeit mit dem von Robert Sablatnig geleiteten Institut für Rechnergestützte Automation der Technischen Universität Wien unter UV-Licht digitalisieren.[10] Bemühungen um eine notwendige finanzielle Förderung für weitere Digitalisierungen zwecks Lesbarmachung der getilgten Schriften wurden fortgesetzt. Im Rahmen eines neuen Projekts „Wichtige Textzeugen in Wiener griechischen Palimpsesten" (2012–2017; ÖAW, FWF)[11] wurde eine intensive Zusammenarbeit mit dem Technischen Team der *Early Manuscripts Electronic Library* (EMEL, Direktor Michael Phelps) in die Wege geleitet,[12] das im Jahre 2013 für dieses Projekt zwei neu entdeckte Handschriften von besonderer kultureller Bedeutung multispektral digitalisiert hat.[13] Daneben wurde auch die Kooperation mit der Technischen Universität Wien fortgesetzt: Ausgewählte griechische Palimpseste der ÖNB hat die TU Wien in den Jahren 2014–2017 im Rahmen eines Pilotprojekts des von Heinz Miklas gegründeten *Centre of Image and Material Analysis in Cultural Heritage* (CIMA) für das genannte Palimpsestforschungsteam der ÖAW aufgenommen.[14]

Mit Hilfe von Bildern, die sich aus den Digitalisierungskampagnen ergeben hatten, erreichten die zuständigen Philologen wichtige Fortschritte in der Entzifferung und Erschließung der wertvollen Texte und in der systematischen Untersuchung und Bearbeitung der betreffenden Palimpseste. Das qualitativ hochwertige Bildmaterial ermöglichte auch tiefere paläographische Einblicke in die originalen Handschriften. Dies soll im Folgenden näher ausgeführt werden.

I. PALIMPSESTFRAGMENTE AUS HERODIANS *DE PROSODIA CATHOLICA* IM CODEX VIND. HIST. GR. 10

Ia. Bemerkungen zur Texterschließung und Forschungsgeschichte

Von herausragender Bedeutung für die Geschichte der griechischen Grammatik und auch der antiken Literatur ist das von Herbert Hunger vor 60 Jahren entdeckte Palimpsest der „Allgemeinen Akzentlehre" (Περὶ καθολικῆς προσῳδίας) des griechischen Grammatikers Ailios Herodianos (2. Jh. n. Chr.). Das Werk, das Herodian dem Kaiser Marcus Aurelius gewidmet haben mag, war eine systematische Darstellung der Regeln der griechischen Akzentlehre. Es enthielt eine Fülle gelehrten Materials und wurde daher in der Spätantike und in Byzanz häufig verwendet. Allerdings bereitete sein Umfang deutliche Überlieferungsprobleme, so dass es schließlich nur

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[6] Mehr dazu unter Ia.

[7] Mehr dazu bei Grusková und Kresten, Palimpsestfragmente.

[8] Mehr dazu bei Gamillscheg und Grusková, Majuskelfragmente.

[9] Vgl. dazu Deckers und Grusková, Zum Einsatz, 358–359; Grusková, *Untersuchungen*, 22–23.

[10] Siehe dazu unter IIIa und IVa und Grusková, *Untersuchungen*, 23–24.

[11] Zu diesem Projekt (FWF P 24523-G19), das von Otto Kresten geleitet und von Jana Grusková an der Österreichischen Akademie der Wissenschaften (Institut für Mittelalterforschung, Abteilung Byzanzforschung) in Kooperation mit internationalen Spezialisten für die zu untersuchenden Texte durchgeführt wurde, siehe Grusková, Further Steps, und weiter unten unter Ia, IIa, IIIa.

[12] EMEL (http://emel-library.org/, abgerufen am 28.11.2020) arbeitet mit einem Team von Spezialisten für „imaging" und „image processing" zusammen, die u.a. das Archimedes-Palimpsest oder die Sinai-Palimpseste lesbar gemacht haben; zum EMEL-Team siehe unter IIa.

[13] Mehr dazu unter IIa und IIIa.

[14] Zum Einsatz kamen hier vor allem eine Nikon-Kamera und eine Hamamatsu-Kamera, später, bei der Digitalisierung einiger Blätter im Juni 2017, auch die (von der TU Wien damals neu erworbene) PhaseOne Kamera. Erstellt und verarbeitet wurden die Aufnahmen durch die Spezialisten des Institute of Visual Computing and Human-Centered Technology der TU Wien, Fabian Hollaus und Simon Brenner (CIMA in Vienna – http://hrsm.caa.tuwien.ac.at/, abgerufen am 28.11.2020) im Rahmen des vom Österreichischen Bundesministerium für Wissenschaft, Forschung und Wirtschaft geförderten SFHEA-Projekts *Analysis and Conservation of Cultural Heritage – Modern Imaging and Material Analysis Methods for the Visualization, Documentation and Classification of Historical Written Material (Manuscripts)*. Heinz Miklas, Robert Sablatnig, Fabian Hollaus und Simon Brenner sei dafür herzlich gedankt. Siehe auch weiter unten in Abschnitt IVa.

in kurzen Epitomen und zahlreichen späteren Zitaten erhalten geblieben ist. Es stieß demgemäß weltweit auf großes Interesse, als Herbert Hunger während der Gesamtkatalogisierung der griechischen Handschriftenbestände der ÖNB in dem unteren „völlig abgewaschenen und kaum lesbaren" Text von zehn Blättern des Codex hist. gr. 10 Fragmente einer Minuskelhandschrift des 10. Jahrhunderts mit Herodians „Allgemeiner Akzentlehre" entdeckt hat.[15]

Der Codex Vind. hist. gr. 10, der an die Wiener Hofbibliothek im 16. Jahrhundert aus der Handschriftensammlung des Humanisten Johannes Sambucus kam, umfasst insgesamt 33 Blätter von jeweils ca. 360 × 260 mm,[16] auf denen zwei Drittel der *Vita* des Ioannes Chrysostomos aus der Feder des Symeon Metaphrastes (*BHG* 875; ed. *PG* 114, 1045–1210) enthalten sind.[17] Der Text beginnt auf f. 1r – nach der Tagesrubrik μηνὶ τῷ αὐτῷ ιγ′ – mit der Überschrift Βίος καὶ πολιτεία τοῦ ἐν ἁγίοις πατρὸς ἡμῶν Ἰωάννου ἀρχιεπισκόπου Κωνσταντινουπόλεως τοῦ Χρυσοστόμου. Die 33 Blätter bilden fünf Lagen, die zu einer nicht mehr feststellbaren Zeit falsch gebunden wurden. In dieser fehlerhaften Blattabfolge wurde der Codex foliiert, so dass der Text heute auf f. 14v endet (*mutile* mit *PG* 114, 1148 C 12 ἄνδρας) (Abb. 1). Die korrekte Blattabfolge lautet: ff. 1–8, 27–33, 23–26, 15–22, 9–14.[18] Aufgrund des Textverlustes kann man schließen, dass aus den fünf erhaltenen Lagen drei oder (eher) fünf Blätter ausgefallen sind.[19] Bei der Herstellung dieser ins Ende des 12. bzw. in den Anfang des 13. Jahrhunderts datierbaren Abschrift der metaphrastischen Chrysostomos-*Vita*[20] wurden palimpsestierte Pergamentblätter aus zwei älteren Codices profanen Inhalts wiederverwendet: Die heutigen ff. 1–8, 24–25 stammen aus der von Herbert Hunger entdeckten Herodian-Handschrift, ff. 9–23 und 26–33 wiederum aus einem um das Jahr 1000 (bzw. wenig später) datierbaren, sonst unbekannten „Florilegium" der Basiliken – wie sich bei der Revision im Jahre 2003 herausstellte.[21] Die Zeilenzahl und der Schriftspiegel der zweispaltig gestalteten (oberen) *Vita* des Ioannes Chrysostomos schwanken erheblich;[22] auf eine regelmäßige Beschneidung des Pergaments wurde nicht geachtet; auf den letzten Blättern ist die *Vita* platzsparender geschrieben als in dem ersten und dem mittleren Teil des Codex, in den letzten zwei Zeilen auf f. 14v wiederum mit deutlich größeren Buchstabenabständen (Abb. 1), was darauf hinweisen könnte, dass der Kopist den Textanschluss zu einem bereits vorhandenen Text erreichen wollte. Fasst man diese Beobachtungen zusammen, liegt die Vermutung nahe, dass es sich bei den 33 erhaltenen Blättern eher um eine spätere Ergänzung zur Restaurierung eines älteren großformatigen Menologion-Codex handeln könnte, d.h. eines Codex, in dem ein Teil der Chrysostomos-*Vita* aus dem originalen Bestand verlorengegangen war. Die den vermuteten Textverlust ergänzenden fünf neuen Lagen, die wohl nicht fest in den alten Menologion-Codex eingebunden waren, sind später herausgefallen bzw. waren herausgenommen worden und wurden dann im 16. Jahrhundert als eine selbstständige Handschrift zum Verkauf angeboten. In diesem Zustand hat Johannes Sambucus das Buch für seine Handschriftensammlung gekauft.

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15 Hunger, *Katalog* I, 15; Hunger, Palimpsest-Fragmente.

16 Zum Codex vgl. Hunger, *Katalog* I, 15; Grusková, *Untersuchungen*, 31–41 (mit weiteren Literaturhinweisen) und 173–178 (Abb. 1–6); Gamillscheg, Der Codex des Herodian, 101–110 (mit Abb. 1–3); Grusková, Zwei neue Basiliken-Handschriften I, 107–122, 133–134, 153–166 (Tafeln); Gamillscheg und Grusková, Neue Techniken, 31–36 (mit Abb. 1–3).

17 Eine neue Edition dieser *Vita* wird von Elisabeth Schiffer (ÖAW, Institut für Mittelalterforschung, Abteilung Byzanzforschung) vorbereitet.

18 Siehe dazu Hunger, *Katalog* I, 15; Hunger, Palimpsest-Fragmente, 1–2; Grusková, *Untersuchungen*, 32–34 (mit weiterführenden Literaturhinweisen); Grusková, Zwei neue Basiliken-Handschriften I, 109–110 und 155 (Tafel III: f. 14v).

19 Vor f. 27 fehlt ein Blatt, vor f. 25 fehlen zwei oder (eher) vier Blätter, jeweils mit Textverlust. Wegen der Abweichungen gegenüber der *PG*-Fassung lässt sich der Ausfall vor f. 25 nicht genau bestimmen.

20 Herbert Hunger (*Katalog* I, 15) hat die Schrift ins 12./13. Jahrhundert, Ernst Gamillscheg (Der Codex des Herodian, 105) ins ausgehende 12. Jahrhundert datiert. Siehe die weiteren Ausführungen von Giuseppe De Gregorio in Ib.

21 Zur Entdeckung dieses „Florilegium" der *Basiliken* siehe Grusková, Zwei neuentdeckte Basiliken-Handschriften, 47. Das *Florilegium Basilicorum Vindobonense* wird seitdem durch Jana Grusková und Bernard Stolte entziffert und untersucht. Zu den bisherigen Ergebnissen vgl. Grusková, Zwei neue Basiliken-Handschriften I, 108–122, 133–134, 154–166 (Tafeln); Stolte, Zwei neue Basiliken-Handschriften II, 139–146, 154–166 (Tafeln); Grusková, *Untersuchungen*, 37–41, 176 (Abb. 4), 178 (Abb. 6); Stolte, Ein Florilegium; Gamillscheg und Grusková, Neue Techniken; Stolte und Grusková, *Florilegium Basilicorum*, und den Beitrag von Bernard Stolte in diesem Band.

22 Eine gewisse Disziplin der oberen Schrift kann man jedoch in der ersten Lage (ff. 1–8), für die ausschließlich Blätter aus dem Herodian-Codex verwendet wurden, feststellen.

Der Text der *Prosodia catholica* wurde ausgiebig getilgt, so dass seine bei normalem Licht erkennbaren Spuren auf den fünf erhaltenen Doppelblättern äußerst gering sind. Durch das mechanische Abtragen der Schrift ist das Pergament an einigen Stellen sehr dünn geworden, wobei sogar ein paar Löcher entstanden sind. Der neue Text, d.h. die *Vita* des Ioannes Chrysostomos, wurde mit dicker Feder und deutlicher schwarzer Tinte jeweils über die getilgten zarten Herodian-Zeilen geschrieben und hat sie damit weitgehend überdeckt. Mit Hilfe der in den 1960er Jahren zur Verfügung stehenden technischen Mittel (UV-Licht und UV-Photos) hat Herbert Hunger nach wiederholten Ansätzen zu verbesserten Lesungen im Laufe von etwa zehn Jahren ca. 15–20% des Palimpsests entziffert und philologisch erfasst. Seine Ergebnisse hat er im Jahre 1967 veröffentlicht.[23] Freilich waren die Versuche besonders in jenen Passagen erfolgreich, in denen der Schriftspiegel des unteren Werkes jenen des oberen an Länge übertraf und die somit leichter lesbar waren. Aufgrund eines Vergleichs des entzifferten Textes mit der Herodian-„Ausgabe" von August Lentz (1867), der die *Epitome* des ‚Ps.-Arkadios' zu Grunde lag, konnte Hunger die originale Blattabfolge rekonstruieren und festlegen, dass im Codex Vind. hist. gr. 10 Bruchstücke von Buch 5, 6 und 7 der *Prosodia catholica* erhalten geblieben sind. Erstaunlich waren die Menge und die Vielfalt an Zitaten aus antiken Autoren, die Herodian anführte, um die Verwendung der für einzelne Regeln genannten Wörter zu belegen.[24]

So überrascht es kaum, dass das Herodian-Palimpsest zu jenen ausgewählten Wiener Zimelien gehörte, die im Rahmen des EU-Projekts „Rinascimento virtuale" mit dem speziellen Kamerasystem RE.CO.RD® von Daniele Broia aufgenommen wurden. Die Digitalisierung, die über die ÖAW (vertreten durch Otto Kresten) veranlasst und finanziert wurde, fand im Februar 2003 an der ÖNB unter der Betreuung von Ernst Gamillscheg statt. Danach haben die Techniker der Fotoscientifica in Parma zuerst selbst versucht, die originale Schrift durch computergestützte Verfahren zu rekonstruieren. Sie haben das Ergebnis in großformatigen Farbbildern fixiert.[25] Als aber der mit der Erschließung des Herodian-Palimpsests damals betraute Spezialist, der Klassische Philologe Klaus Alpers (Universität Hamburg), versucht hat, mit Hilfe dieser künstlichen Farbbilder den Text zu entziffern, hat sich die vom Computer durchgeführte Rekonstruktion der originalen Schrift als für eine korrekte Textentzifferung und Detailuntersuchung ungeeignet erwiesen,[26] auch wenn die genannten Farbbilder für einen wenig ins Detail gehenden Überblick nützlich waren und an einigen nicht überdeckten Stellen sogar gewisse Lesungsfortschritte ermöglichten.[27] Es ist damit klar geworden, dass nur eine direkt an den originalen Aufnahmen durchgeführte gründliche paläographisch-philologische Analyse einen methodologisch konsequenten Weg zu einer korrekten Textentzifferung darstellen kann. Otto Kresten, der Obmann der Kommission für Byzantinistik der ÖAW, der die neue Forschung am Herodian-Palimpsest vom Anfang an betreute, hat anschließend (im Rahmen des von ihm geleiteten Projekts „Griechische Palimpseste") die originalen Palimpsestaufnahmen, welche die untere Schrift getreu wiedergaben, von der Fotoscientifica erbeten. Unter diesen Aufnahmen, die uns ab dem Jahre 2008 zur Verfügung standen, leisteten vor allem die UV-Fluoreszenzaufnahmen in Pseudofarben substantielle Hilfe (vgl. Abb. 2). Mit der arbeitsintensiven und anspruchsvollen Textentzifferung und seit dem Jahre 2010 (auf Vorschlag von Klaus Alpers) auch mit der Leitung der Untersuchungen an den Wiener Herodian-Fragmenten wurde die Autorin dieser Zeilen betraut. Allerdings wurde eine für die Auswertung der Aufnahmen geeignete Arbeitsplattform samt notwendiger technischer Ausstattung erst mit dem im Jahre 2012 begonnenen FWF-Projekt „Wichtige Textzeugen in Wiener griechischen Palimpsesten" geschaffen.[28] Die Entzifferung und (wo nötig) die Rekonstruktion des ausgiebig getilgten und zumeist durch die obere Schrift überdeckten Herodian-Textes waren äußerst mühsam und zeitaufwendig. Nach vielen, oft wiederholten Versuchen, um mit Hilfe der genannten UV-Fluoreszenzaufnahmen Fortschritte bei der Entzifferung zu machen – wobei uns seit 2015/2016 auch multispektrale Aufnahmen, die für uns die TU Wien mit einer Nikon-

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[23] Hunger, Palimpsest-Fragmente.

[24] Siehe Hunger, Palimpsest-Fragmente, 15–29.

[25] Vgl. die Abbildung bei Gamillscheg, Der Codex des Herodian, 108, Abb. 2 (f. 5r); Gamillscheg und Grusková, Neue Techniken, 31 (f. 5v); Grusková, *Untersuchungen*, 174, Abb. 2 (f. 7r).

[26] Die in ihnen gegebene Darstellung der originalen Schrift war einerseits oft falsch und damit irreführend, andererseits waren wichtige Details, die sich bei einer autoptischen Untersuchung unter UV-Licht als vorhanden erkennen ließen, in ihnen nicht zu sehen. Vgl. den Beitrag von Felix Albrecht und Chiara Faraggiana di Sarzana in diesem Band.

[27] Siehe Primavesi und Alpers, Empedokles.

[28] Siehe dazu Grusková, Further Steps, 71–74. Zum Projekt siehe oben, Anm. 11.

Kamera erstellt hatte, als eine zusätzliche Informationsquelle zur Verfügung standen –,[29] gelang es uns bis zum Anfang 2018, den größeren Teil des im Palimpsest erhaltenen Textes der *Prosodia catholica* zu entziffern.[30] Um weitere Fortschritte zu erreichen, wurde im Jahre 2018 ein neues Forschungsprojekt von Otto Kresten und Jana Grusková an der ÖAW in Wien (ABF) in Zusammenarbeit mit der ÖNB auf die Beine gestellt, das inzwischen vom Österreichischen Wissenschaftsfonds FWF eine Förderung bekommen hat.[31] Zu dem für die Erschließung und die Edition der Wiener Herodian-Fragmente zuständigen Forscherteam, Klaus Alpers (Universität Hamburg), Jana Grusková (ÖAW Wien/Comenius-Universität Bratislava) und Oliver Primavesi (LMU München), sind Nigel Wilson (Oxford, Lincoln College) und schließlich Herbert Bannert (Universität Wien) dazugewonnen worden. Das neue Projekt setzt sich zum Ziel, das Wiener Herodian-Palimpsest möglichst vollständig zu entziffern, kritisch zu edieren und systematisch zu erschließen. Um die bisher unlesbaren Textteile lesbar zu machen, sollen neue Zugänge aus dem Gebiet der digitalen Wiedergewinnung getilgter Schriften erprobt werden. Die folgenden paläographischen Beobachtungen basieren auf dem bis Anfang 2018 zur Verfügung stehenden Bildmaterial und sind daher als ein work-in-progress-Bericht zu betrachten.

Ib. Paläographische Bemerkungen

In der oberen Schrift des Codex Vind. hist. gr. 10 (Abb. 1)[32] lassen sich zwei zusammenarbeitende, mitten in einer Lage wechselnde Hände erkennen, Hand A (ff. 1r–8v, 27r–33v, 23r–26v, 15r–18r) und Hand B (ff. 18v–22v, 9r–14v), deren Duktus provinzielle Züge aufweist.[33] Herbert Hunger hat in den 1960er Jahren die obere Schrift ins Ende des 12. bzw. den Anfang des 13. Jahrhunderts datiert.[34] Ernst Gamillscheg schlug vor etwa fünfzehn Jahren vor, die obere Schrift ins ausgehende 12. Jahrhundert zu datieren, wobei er für die Hand A die Schrift des Mönchs Kosmas, der im Jahre 1185 Codex Lond. Add. 28,817 (*Diktyon* 39068) anfertigte,[35] als Vergleichsbeispiel genannt hat.[36] Vergleicht man aber die Schrift des Codex hist. gr. 10 mit ein wenig später datierten Handschriften – z.B. dem Codex Athen. Gennadeios 1.5 (*Diktyon* 7321) aus dem Jahr 1226[37] –, lässt sich eine Datierung ins beginnende 13. Jahrhundert nicht ausschließen.[38]

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[29] Vgl. dazu oben mit Anm. 14. Die Bilder wurden von Fabian Hollaus (CIMA in Vienna) aufgenommen und verarbeitet.

[30] Siehe in Alpers *et al.*, Prolegomena. Die Ergebnisse der bisherigen Untersuchungen (samt einer vorläufigen Edition ausgewählter Palimpsestseiten) werden in absehbarer Zeit in einer Reihe von Aufsätzen veröffentlicht werden.

[31] Das Projekt FWF P 31939-G25 „Das Wiener Herodian-Palimpsest“ wird von Otto Kresten geleitet und ist an der ÖAW (Institut für Mittelalterforschung, Abteilung Byzanzforschung) angesiedelt. Es wird dort von Jana Grusková in Zusammenarbeit mit den genannten externen Forschungspartnern seit dem 01.02.2019 durchgeführt. Siehe die Projekt-Homepage unter https://www.oeaw.ac.at/byzanz/sprache-text-und-schrift/buchkultur-palaeographie-und-palimpseste/wiener-herodian-palimpsest (abgerufen am 28.11.2020). Der vorliegende Beitrag entspricht inhaltlich dem an der Wiener Konferenz „New Light on Old Manuscripts“ im April 2018 gehaltenen Vortrag und spiegelt den Stand am Anfang des Projekts wider, im Rahmen dessen er für die Publikation vorbereitet wurde. Mein aufrichtiger Dank für die langjährige Zusammenarbeit am Herodian-Palimpsest gilt dem am 25. März 2022 verstorbenen hochgeschätzten Kollegen und Freund Klaus Alpers.

[32] Zum Codex vgl. die in Anm. 16 zitierte Literatur.

[33] So bereits bei Gamillscheg, Der Codex des Herodian, 105.

[34] Vgl. Hunger, *Katalog* I, 15, und Hunger, Palimpsest-Fragmente, 1: „12./13. Jh.“

[35] RGK I, Nr. 217.

[36] Vgl. Gamillscheg, Der Codex des Herodian, 105: „Diese Kombination“ – d.h. der unteren Texte – „spricht für eine Entstehung der scriptura superior in der Umgebung von Konstantinopel (bzw. im Zentrum des byzantinischen Reiches), auch wenn der Duktus der Kopisten provinzielle Züge aufweist. Hand A schreibt ff. 1–8. 27–33. 23–26 (Abb. 1: f. 2r) sowie in einer kursiveren Variante 15–18r, vergleichbar ist der Mönch Kosmas, der im Jahre 1185 Cod. Lond. Add. 28,817 abschloß, Hand B verdanken wir ff. 18v–22 und 9–14. Der Gesamteindruck der Schrift wird für Hand B durch quadratische Formen definiert, auffällig ist das Phi mit Mittelstrich (Abb. 3: f. 9r). Der Handwechsel auf einem Blatt weist auf skriptorielle Zusammenarbeit.“

[37] Digitalisat des Athener Codex bei: http://www.csntm.org/Manuscript/View/GA_1797 (abgerufen am 28.11.2020).

[38] Eine identische Beobachtung hat auch Nigel Wilson gemacht (schriftliche Mitteilung vom 20. Juli 2019): „Ernst Gamillscheg (2003/2009) suggested a date towards the end of the 12th century, and inferred that by then Herodian and the Basilika were texts that had lost their importance and could be discarded. His date rests on comparison with the script in MS British Library Add. 28,817, dated 1185, shown in Lake, plate 149. But in my opinion the similarity of script is not so great as to exclude a later date. Traditional archaising/conservative script of this kind can be seen in MSS from the 13th century. Even as late as 1273 and 1279/80 one finds examples (MSS Vat. gr. 2153 and Vat. gr. 644, shown in Turyn, plates 28 and 36), which are not wholly dissimilar.“ Siehe dazu auch die Beobachtungen von K. Alpers, J. Grusková, N. Wilson, H. Bannert und O. Primavesi in Alpers *et al.*, Prolegomena. Vor Herbert Hunger hat man die Handschrift ins 13. Jahrhundert datiert.

Abb. 1: ÖNB, Codex hist. gr. 10, oben: f. 7r (Detail), Hand A; unten: f. 14v (Detail), Hand B
Digitalisiert von Fotoscientifica, Parma
(© ÖAW-Projekt „Griechische Palimpseste“)

Wie oben gezeigt, liegt die Vermutung nahe, dass es sich beim Codex hist. gr. 10 um eine zur Restaurierung dienende Ergänzung eines älteren Menologion-Codex größeren Formats handelt. Für die Abschrift des betreffenden Teils der *Vita* wurde Beschreibstoff sekundärer Qualität, und zwar palimpsestierte Pergamentblätter aus zwei älteren großformatigen Handschriften profanen Inhalts, verwendet. Bezüglich des Ortes, wo man um 1200 die beiden in der unteren Schrift identifizierten, im Umfang und Format, aber auch inhaltlich beachtlichen Handschriften vorfinden konnte, würde man eher – trotz der provinziellen Züge der beiden oberen Kopisten A und B – an das Zentrum des byzantinischen Reiches denken. Irgendwann während des für die Entstehung der oberen Schrift in Frage kommenden Zeitintervalls haben die Kopisten der metaphrastischen *Vita* oder jemand anderer, in dessen Besitz sich die Herodian-Handschrift und die Basiliken-Handschrift damals befanden, das Pergament dieser älteren profanen Handschriften zur Wiederverwendung für neue Texte zur Verfügung gestellt. Die Kopisten der oberen Schrift könnten dabei den benötigten Beschreibstoff auch gekauft haben, da Pergament im Byzanz einen kommerziellen Wert hatte. Man kann mit Nigel Wilson weiter überlegen:[39] „If a later date is possible, a hypothesis about the origin of the Vienna MS may be suggested. In the aftermath of 1204 there must have been many badly damaged books lying in the ruins of libraries, volumes too badly damaged to be repaired with substitute folios. But parchment was a valuable commodity and could be reused. The Archimedes codex, as it is generally known, includes leaves from several other MSS and was assembled in the 13th century. The Vienna MS could be a parallel case.“[40]

[39] Schriftliche Mitteilung vom 20. Juli 2019.

[40] Vgl. dazu Wilson, The Archimedes Palimpsest, besonders 63. Zu einem ähnlichen Schicksal von Büchern nach der Einnahme der Stadt im Jahre 1453 siehe zuletzt Alpers, Zum Bremer „Cyrill-Glossar“, 357.

Die Minuskelhandschrift der Καθολικὴ προσῳδία des Herodian, aus der die zehn Wiener Blätter (ff. 1–8, 24–25) stammen, wurde aller Wahrscheinlichkeit nach im konstantinopolitanischen Raum produziert. Da ein großer Teil des Palimpsests immer noch unlesbar ist, können im Folgenden nur einige vorläufige paläographische Beobachtungen angeführt werden. Der Herodian-Text ist von einer einzigen Hand in *scriptio continua* geschrieben und einspaltig zu 45 bzw. 47 Zeilen pro Seite gestaltet, mit einem Schriftspiegel von ca. 315 × 180/190 mm (ohne Marginalien).[41] Wir haben es hier mit einer kalligraphischen Ausformung aus den allerersten Jahrzehnten des 10. Jahrhunderts zu tun (Abb. 2), für die Parallelen etwa bei Kopisten aus dem studitischen Milieu zu finden sind, worauf bereits Ernst Gamillscheg hingewiesen hat.[42] Ein gutes Vergleichsbeispiel bieten etwa die hagiographischen Zwillingshandschriften Vat. gr. 1660 (*Diktyon* 68291) (z.B. f. 193r) und Vat. gr. 1669 (*Diktyon* 68300) (z.B. f. 11v):[43] Die Hand des Mönches Ioannes in dem ersten dieser beiden Teilmenologien trägt eine Datierung auf das Jahr 916; der Schreiber des zweiten Codex ist anonym, eine Datumsangabe fehlt. Nigel Wilson hat auf deutliche Ähnlichkeiten mit der Schrift von Baanes hingewiesen, der z.B. den auf das Jahr 913/914 datierten Codex Paris. gr. 451 (*Diktyon* 50025) geschrieben hat:[44] „If it is not him, it is a close colleague or pupil, and so the date is fixed within fairly narrow limits.“[45] Da die Charakteristika unserer Fragmente auch in Handschriften des ausgehenden 9. Jahrhunderts zu finden sind, ist allerdings eine Datierung in eine noch geringfügig frühere Zeit nicht vollkommen auszuschließen.[46] Zu vergleichen wäre z.B. der Codex Caseolinus des Ioannes Lydos (Paris. suppl. gr. 257, *Diktyon* 53021), besonders die zweite Hand, aus der zweiten Hälfte bzw. dem Ende des 9. Jahrhunderts.[47] Eine gute Parallele für die Schrift findet man auch in den von Diether Roderich Reinsch eingehend untersuchten Fragmenten einer Organon-Handschrift (gr. NF M 138, *Diktyon* 60965) aus dem Katharinen-Kloster auf dem Sinai.[48]

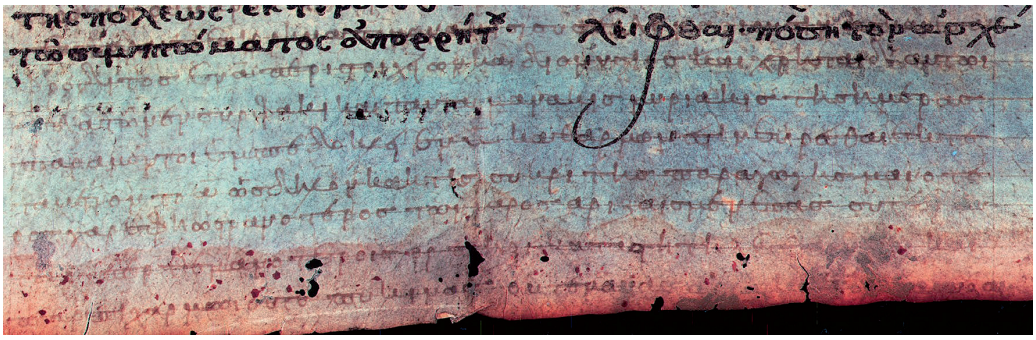

Abb. 2: ÖNB, Codex hist. gr. 10, f. 7r (Detail), digitalisiert von Fotoscientifica, Parma.
UV-Fluoreszenzaufnahme in Pseudofarben
(© ÖAW-Projekt „Griechische Palimpseste“)

[41] Zu weiteren Details siehe die Beobachtungen von K. Alpers, J. Grusková, N. Wilson, H. Bannert und O. Primavesi in Alpers *et al.*, Prolegomena, und Grusková, *Untersuchungen*, 35–37.

[42] Vgl. Gamillscheg, Der Codex des Herodian, 104: „Zu vergleichen wäre etwa der Kopist Johannes, der im Jahre 916 eine hagiographische Sammlung im Kloster Studiu kopierte (RGK III 126, Nr. 317), oder Stylianos, dem wir einen Codex mit Johannes Chrysostomos verdanken, entstanden im Jahre 939 im Auftrag des Protospatharios Kalokyros (RGK II 181, Nr. 506)“, 108 (Abb. 2: f. 5r).

[43] RGK III, Nr. 317; Digitalisate bei: https://digi.vatlib.it/view/MSS_Vat.gr.1660 und https://digi.vatlib.it/view/MSS_Vat.gr.1669 (abgerufen am 28.11.2020). Siehe auch Gamillscheg, Der Codex des Herodian, 104, und seine in Anm. 42 zitierten Beobachtungen.

[44] RGK I, Nr. 30; https://gallica.bnf.fr/ark:/12148/btv1b84701396/ (abgerufen am 28.11.2020). Zu Baanes vgl. zumindest Canart, Varia palaeographica, 2, 103–120 [Nachdr. 1179–1196].

[45] Schriftliche Mitteilung vom 3. Oktober 2018 und 4. November 2020. Im Herodian-Palimpsest fehlen allerdings weitgehend einige kursivere Elemente – etwa die Auseinandergliederung des Epsilon in zwei Teilen –, welche zum Hauptbestand des Schriftbildes von Baanes gehören.

[46] Vgl. Alpers, Die griechischen Orthographien, 2 Anm. 9 („um 900 oder nicht lange danach“).

[47] Vgl. De Gregorio, Materiali vecchi e nuovi, 145–146 mit Abb. 27a–b; siehe auch Perria, Un nuovo testimone; Digitalisat bei: https://gallica.bnf.fr/ark:/12148/btv1b110048901 (abgerufen am 28.11.2020).

[48] Reinsch, Fragmente einer Organon-Handschrift; De Gregorio, Materiali vecchi e nuovi, 151 (Addendum nr. 7).

Die Minuskelschrift der Wiener Herodian-Fragmente tendiert zur Ausgewogenheit und Rundung der Buchstabenformen und wird daher denjenigen Handschriften zugerechnet, die in ihrem Duktus bereits eine ausgerundete Tendenz anklingen lassen.[49] Der Kopist neigt dazu, seinem Duktus eine leichtere Form zu geben. Die Schrift ist generell „mittelzeilig" geschrieben, d.h. an der Linie (der Blindliniierung), die den Mittelbau durchquert. Die Schriftrichtung würde man insgesamt als senkrecht bezeichnen, mit Ausnahme von (1) den Unterlängen von (Minuskel)Lambda, Xi und Zeta und (2) der oberen Haste des Epsilon in den Ligaturen Epsilon-Iota, Epsilon-Chi und Epsilon-Sigma, die (1) nach links unten bzw. (2) nach rechts oben gerichtet sind. Die Verteilung der Ober- und Unterlägen ist ausgewogen; bei einigen Buchstaben sind sie allerdings markanter ausgeprägt, wie z.B. bei Delta bzw. Xi, Zeta, (Minuskel)Lambda. Es handelt sich um eine reine Minuskel mit Ausnahme des Buchstabens Lambda, der in beiden Formen vorkommt, und des üblichen „spitzbögigen" Theta der Frühminuskel. Auffällig sind die gelegentlichen Rundungen des Epsilon (so z.B. immer in der Ligatur Epsilon-Pi oder Epsilon-Tau) und des Theta wie auch die auf einigen Seiten vorkommenden großen Rundungen des lunaren Majuskelsigma mit involviertem Omikron bei der Endung -ος. Unterlängen (etwa bei Phi, Rho, Ny) und Oberlängen (etwas bei Eta, Kappa) enden bisweilen in kleinen Häkchen. Gamma erscheint mit entweder spitz oder in eine enge Schleife zulaufendem Unterkörper, Eta immer in Form eines lateinischen h. Auffallend sind die Ligaturen wie Sigma-Tau, Sigma-Pi, Epsilon-Sigma, Epsilon-Iota, Epsilon-Chi, Epsilon-Xi, Epsilon-Pi, Epsilon-Tau, Pi-Tau, Doppel-Tau und Doppel-Sigma. Stellenweise findet sich die Abkürzung für καί in Form von S. Für die selten vorkommenden Initialen wurden leicht vergrößerte Textbuchstaben verwendet. *Iota adscriptum* wird generell geschrieben; versehentliche Auslassungen kommen vor. Der Kopist hat seinen Text so gut wie ausschließlich ohne Akzente und Spiritus geschrieben; nur ausnahmsweise treten hier und da einige Akzente auf. Vereinzelt werden Spiritus gesetzt, bisweilen auch falsch. Die Auslassung von Akzenten und Spiritus könnte darauf hindeuten, dass der Text aus einer nicht-akzentuierten Vorlage kopiert wurde, die möglicherweise noch in Majuskeln geschrieben war. Allerdings: Angesichts der Tatsache, dass es sich hier um eine bereits entwickelte Minuskelschrift eines offensichtlich geübten Kopisten handelt, für den es keine größere Schwierigkeiten bereitet haben dürfte, aus einer nicht-akzentuierten (Majuskel?)Vorlage eine durchaus mit Akzenten und Spiritus versehene Minuskel-Abschrift anzufertigen, erhebt sich die Frage, ob man nicht bei einem so spezifischen Text, in dem Kanones der Akzentuierung und Abweichungen davon dargestellt werden, auf das Setzen von Akzenten (und Spiritus) absichtlich verzichtet hat, was generell ungewöhnlich war. Dies könnte dadurch bestätigt werden, dass z.B. auf f. 7v eine Partie des Herodian-Textes vorhanden ist, in welcher die prosodischen Zeichen problemlos (und im allgemeinen korrekt) gesetzt sind:[50] Die weiteren Untersuchungen über dieses Palimpsest werden sicherlich das Bild ergänzen.[51]

Wenn nicht von derselben, dann jedenfalls von einer zeitgenössischen Hand wurden auch die am Rand der meisten Seiten in Kleinmajuskel eingetragenen, den Inhalt des betreffenden Kanons resümierenden Marginalien geschrieben, die offensichtlich nicht von Herodian stammen, sondern zur Orientierung des nachschlagenden Lesers zum Herodian-Text hinzugefügt wurden.[52]

Der originale Herodian-Codex hatte ein durchaus beeindruckendes Format von ca. 390 × 270 mm. Die erhaltenen fünf Doppelblätter haben im Original zu vier Quaternionen gehört, in denen die *lex Gregory* berücksichtigt wurde. Soweit sich erkennen lässt, wurden die Blätter nach dem Linienschema Leroy–Sautel 33A1d (mit einer zusätzlichen vertikalen Linie links) liniiert.[53]

Das Milieu, in dem die Herodian-Handschrift entstand, wird wohl in gebildeten konstantinopolitanischen Kreisen aus der Zeit der ersten makedonischen Kaiser zu suchen sein, wobei wir einen professionellen Schreiber am Werk sehen, der höchstwahrscheinlich für eine Gelehrtenpersönlichkeit tätig war, wie dies etwa in der

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[49] Vgl. Reinsch, Fragmente einer Organon-Handschrift, 62.

[50] Zu weiteren Details siehe die Beobachtungen von K. Alpers, J. Grusková, N. Wilson, H. Bannert und O. Primavesi in Alpers *et al.*, Prolegomena. Siehe dazu auch Hunger, Palimpsest-Fragmente, bes. 8, und Grusková, *Untersuchungen*, 35–37.

[51] Diese Untersuchungen werden im Rahmen des oben genannten neuen Projekts, das der weiteren Erschließung des Herodian-Palimpsests gewidmet ist, durchgeführt.

[52] Vgl. dazu Hunger, Palimpsest-Fragmente, 22, und die ausführlicheren Beobachtungen in Alpers *et al.*, Prolegomena.

[53] Die Blätter wurden bei der Wiederverwendung um ca. 25–35 mm in der Höhe beschnitten, zumeist im unteren Teil, wobei es manchmal zu Textverlust in der letzten Herodian-Zeile kam; um einige Millimeter wurde wohl auch der äußere Rand beschnitten; siehe dazu Hunger, Palimpsest-Fragmente, bes. 2; Grusková, *Untersuchungen*, 35–37. Zu weiteren kodikologischen Details siehe Alpers *et al.*, Prolegomena.

nämlichen Zeit bei den verschiedenen im Dienste des Metropoliten Arethas von Kaisareia stehenden Kopisten der Fall war.

II. *SCYTHICA VINDOBONENSIA* ALIAS *DEXIPPUS VINDOBONENSIS* IM CODEX VIND. HIST. GR. 73

IIa. Bemerkungen zur Texterschließung und Forschungsgeschichte

Dem ff. 1–184 umfassenden Altbestand des Wiener Codex hist. gr. 73 (*Diktyon* 70950), einer im 10. Jahrhundert erstellten Handschrift der *Constitutiones apostolorum*, wurden im 13. Jahrhundert elf palimpsestierte Pergamentblätter mit mehreren Texten christlichen Inhalts hinzugefügt (ff. 185–195).[54] Die untere, getilgte Textschicht der letzten acht Seiten dieser Appendix, ff. 192r–195v, hat in den letzten Jahren großes Interesse hervorgerufen. Im Jahre 2010 wurde nämlich von der Autorin dieser Zeilen die Entdeckung bekannt gemacht, dass sich dort unbekannte historische Fragmente befinden, die aus dem bis auf einige Exzerpte und Zitate bei späteren Autoren verlorenen Werk *Scythica* des im 3. Jahrhundert n. Chr. lebenden griechischen Historikers Dexippos von Athen stammen könnten.[55] Die Minuskelschrift der originalen, einspaltig zu 30 Textzeilen pro Seite gestalteten Handschrift ließ sich ins 11. Jahrhundert datieren. Seitdem sind in der Bearbeitung des Fundes, zu welcher die Autorin dieser Zeilen und Otto Kresten (als Projektleiter) Gunther Martin, einen Experten für Dexippos, zur Kooperation eingeladen hatten, bedeutende Fortschritte erreicht worden. Grusková und Martin haben als Editoren der neuen Fragmente, die nunmehr als *Scythica Vindobonensia* alias *Dexippus Vindobonensis* bekannt geworden sind, die Entzifferung und Erschließung des Textes fortgesetzt, und dies zuerst im Rahmen des an der ÖAW durchgeführten FWF-Projekts P 24523-G19 „Wichtige Textzeugen in Wiener griechischen Palimpsesten“.[56] Zur Lesbarmachung der getilgten Schrift hat das Projekt Spezialaufnahmen anfertigen lassen: Die erste multispektrale Digitalisierung fand – unter der organisatorischen und wissenschaftlichen Betreuung durch die Autorin dieser Zeilen – im Frühjahr 2013 an der ÖNB in Wien statt und wurde durch das technische Team der Early Manuscripts Electronic Library (EMEL), das vom Direktor der EMEL Michael Phelps geleitet war, durchgeführt. Zum Einsatz kamen die MegaVision-Kamera von Kenneth Boydston und das von William Christens-Barry entwickelte multispektrale LED-Beleuchtungssystem. Boydston hat unter Mitarbeit von Damianos Kasotakis hochauflösende multispektrale Aufnahmen angefertigt, die danach durch die „image scientists“ Roger L. Easton, Jr., Keith T. Knox, David Kelbe und William Christens-Barry unter Anwendung spezieller Methoden der Bildverarbeitung bearbeitet wurden.[57] Die daraus erfolgten „processed images“ wurden an die beiden Editoren, Jana Grusková und Gunther Martin, geschickt.[58]

Einige Textpassagen waren gut lesbar, andere konnten die Editoren nur mit großem Zeitaufwand und nach wiederholten Versuchen entziffern, nicht wenige Stellen blieben aber unsicher oder ganz unlesbar. Es ist damit klar geworden, dass der Prozess der digitalen Wiedergewinnung der originalen Schrift und die weitere Entzifferung des gründlich getilgten Textes noch mehrere Jahre beanspruchen würden. Jedoch ließen bereits die ersten Erschließungsergebnisse erkennen, dass das Palimpsest unerwartet reich an historischer Information ist. Detaillierte Schilderungen über mehrere Ereignisse während der Einfälle von Goten in die römischen Provin-

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[54] Zum Codex siehe Hunger, *Katalog* I, 82–83, Grusková, *Untersuchungen*, 42–53, 179–181 (Abb. 7–9), und die Beobachtungen von G. De Gregorio, E. Gamillscheg, J. Grusková, O. Kresten, G. Martin, B. Mondrain und N. Wilson in De Gregorio *et al.*, Palaeographical and Codicological Remarks, 5–13 (mit weitführenden Literaturverweisen). Zu den Gebeten auf ff. 193v–194v bereitet Elisabeth Schiffer eine Studie im Rahmen des an der ÖAW (Institut für Mittelalterforschung, Abteilung Byzanzforschung) durchgeführten Euchologien-Projekts (Projektleiterin: Claudia Rapp) vor.

[55] Siehe Grusková, *Untersuchungen*, 50–53, 181 (Abb. 9). Die Entdeckung erfolgte aus der in der Einleitung dargestellten systematischen Bearbeitung der Wiener griechischen Palimpseste. Mit Hilfe der damaligen technischen Mittel ließen sich nur 15% des Textes entziffern. Zum ersten Mal habe ich den Fund im April 2010 in Hamburg bei der internationalen Tagung „Handschriften- und Textforschung heute“ (anlässlich des 70. Geburtstages von D. Harlfinger) vorgestellt.

[56] Mehr dazu bei Grusková, Further Steps, bes. 75–77, und in dem Bericht über die Geschichte und Perspektiven von J. Grusková, G. Martin und O. Kresten in Grusková *et al.*, „Scythica Vindobonensia“.

[57] Dem technischen Team der EMEL sei an dieser Stelle herzlich gedankt.

[58] Siehe dazu die Erläuterungen von J. Grusková und G. Martin in Grusková *et al.*, „Scythica Vindobonensia“, 75–76, und in Grusková *et al.*, Images, 549–550. Für Einblicke in die Geschichte der digitalen Wiedergewinnung des Dexippos-Palimpsests siehe Grusková *et al.*, Insights into the Digital Recovery.

zen auf dem Balkan in der Mitte des 3. Jahrhunderts n. Chr. kamen schrittweise ans Licht.[59] Um die bereits entzifferten Textteile möglichst früh anderen Forschern zur Verfügung zu stellen, auch wenn der Text an vielen Stellen unsicher, manchmal sogar lückenhaft war, haben Martin und Grusková in den Jahren 2014–2015 sechs der insgesamt acht Palimpsestseiten, und zwar den auf ff. 192v+193r, 194rv, 195rv des Codex hist. gr. 73 überlieferten Text, in einer Arbeitstranskription mit den ersten, vorläufigen Erschließungsergebnissen und Beobachtungen publiziert.[60] F. 192r und f. 193v ließen sich mit Hilfe der damaligen technischen Mittel bis auf wenige Buchstaben nicht lesbar machen. Parallel zur weiteren Textentzifferung arbeiteten Martin und Grusková an einer kritischen Edition, der *editio princeps* der *Scythica Vindobonensia* an einem eingehenden Kommentar zum Text und an ausführlichen Studien zu Einzelfragen (wie Autorschaft, Sprache und Stil u.a.).[61]

Um Fortschritte bei der Wiedergewinnung der getilgten Schrift in den immer noch unlesbaren Teilen des Textes zu erreichen, mussten neue Digitalisierungsansätze erprobt werden.[62] Darüber hinaus war eine weitergehende historische und historiographische Kontextualisierung der neuen Fragmente notwendig, zu deren Unterstützung eine enge Kooperation mit Fritz Mitthof vom Institut für Alte Geschichte und Altertumskunde, Papyrologie und Epigraphik der Universität Wien aufgebaut wurde, aus der sich anschließend ein neues FWF-Projekt, P 28112-G25 „Scythica Vindobonensia“ (2015–2020), ergab.[63] Um den historischen und historiographischen Kontext der Fragmente von der römischen bis in die byzantinische Zeit mit Spezialisten aus verschiedenen Fachbereichen zu diskutieren, fand im Rahmen des neuen Projekts im Mai 2017 in Wien die internationale Tagung „Empire in Crisis: Gothic Invasions and Roman Historiography“ statt und im Anschluss daran ein paläographisches Colloquium zum Wiener Palimpsest.[64] Eine weitere multispektrale Digitalisierung durch das EMEL-Team, bei der neue Zugänge erprobt wurden, wurde im Jahre 2016 an der ÖNB in Wien durchgeführt.[65] Darüber hinaus hat das Projektteam die problematischen Textstellen mit Hilfe der Röntgenfluoreszenzanalyse (RFA) Ende 2017 in Kooperation mit Leif Glaser am Deutschen Elektronen-Synchrotron (DESY) in Hamburg aufnehmen lassen. Zuerst wurde die RFA-Methode im Labor der Bundesanstalt für Materialforschung und Prüfung (BAM) in Berlin mit dem XRF Imaging Spectrometer M6 JetStream des CSMC in Kooperation mit Ira Rabin und Oliver Hahn getestet.[66] Seitdem wenden die „image scientists“ Roger L. Easton, Jr., und Keith T. Knox in ständigem Austausch mit Grusková und Martin verschiedene Methoden des „image processing“ an dem gesammelten umfangreichen Bildmaterial an, um die Grenze des Lesbaren weiter zu verschieben. Anschließend werten die beiden Editoren jedes neue „processed image“ gründlich aus, um die Textentzifferung fortzuführen, und vervollständigen Schritt für Schritt die kritische Edition des *Dexippus Vindobonensis*, die nach dem Abschluss aller Arbeiten an der Wiedergewinnung der getilgten und verdeckten Schrift und an der Entzifferung und der Erschließung des Textes publiziert werden wird.

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[59] Siehe die Darstellung von G. Martin and J. Grusková in Grusková *et al.*, „Scythica Vindobonensia“, 82–84.

[60] Martin und Grusková, „Dexippus Vindobonensis“ (ff. 192v+193r), für wichtige Corrigenda siehe Grusková und Martin, Rückkehr, bes. 269–270; Martin und Grusková, „Scythica Vindobonensia“ (ff. 194v, 195r); Grusková und Martin, Ein neues Textstück (f. 194r); Grusková und Martin, Zum Angriff der Goten (f. 195v). Ein paar neue Buchstaben (f. 195v, 6–10) sind in Grusková und Martin, Neugelesener Text veröffentlicht worden.

[61] Der erste Teil dieser Edition (Fr. I und Fr. II der *Scythica Vindobonensia*) wird in absehbarer Zeit erscheinen; siehe Martin und Grusková, „Dexippus Vindobonensis“.

[62] Mehr dazu Grusková *et al.*, Insights into the Digital Recovery. Um alle potentiell brauchbaren Daten über die untere Schrift zu sammeln (d.h. beim Einsatz unterschiedlicher Aufnahmetechniken), hat das Projektteam der ÖAW die vier Blätter von der Technischen Universität Wien (Fabian Hollaus) im Rahmen des CIMA-Projekts mit einer Nikon-Kamera multispektral aufnehmen lassen. Siehe dazu die Einleitung mit Anm. 14.

[63] Zu diesem Projekt siehe den Bericht von J. Grusková, G. Martin und O. Kresten in Grusková *et al.*, „Scythica Vindobonensia“, 78–81. Geleitet wird es von Fritz Mitthof (Universität Wien) und Otto Kresten als nationalem Forschungspartner (ÖAW, Institut für Mittelalterforschung, Abteilung Byzanzforschung).

[64] Siehe dazu den von F. Mitthof, G. Martin und J. Grusková herausgegebenen Tagungsband, *Empire in Crisis*, und den dort veröffentlichten Aufsatz De Gregorio *et al.*, Palaeographical and Codicological Remarks. Für eine Bibliographie der seit der Entdeckung publizierten Beiträge zu den *Scythica Vindobonensia* siehe ebenda, 565–570.

[65] Mehr dazu bei Grusková *et al.*, Insights into the Digital Recovery.

[66] Das Projekt I-20170505 EC “Fast scanning X-ray Fluorescence mapping of the Dexippus Palimpsest”, Projektleiter Jana Grusková; Principal investigator Leif Glaser (DESY). Die Aufwendungen für die Reise der Handschrift nach Hamburg hat die ÖAW aus dem Holzhausen-Legat aufgrund eines Antrags von Fritz Mitthof, dem Leiter des Projekts „Scythica Vindobonensia“, übernommen. Siehe dazu Grusková *et al.*, Insights into the Digital Recovery, 960–962. Aufsätze mit Ergebnissen dieses Experiments sind in Vorbereitung.

IIb. Paläographische Bemerkungen

Bei der *scriptio inferior* der vier Palimpsestblätter des Codex hist. gr. 73 der ÖNB, auf denen die *Scythica Vindobonensia* alias *Dexippus Vindobonensis* überliefert sind (ff. 192r–195v),[67] handelt es sich um eine einzige flüssige Hand, die sich einer leicht rechtsgeneigten, zu runden Formen tendierenden, in der Größe eher bescheidenen Schrift bedient, in Anlehnung an ein breit zu verstehendes, weniger anspruchsvolles und in manchen Formen unregelmäßiges Perlschrift-Modell (Abb. 3). Die Schrift ist großzügig angelegt und „hängt" (d.h. die mittlere Buchstabenhöhe ist unterzeilig orientiert). Sie könnte an eine informellere Ausgestaltung erinnern, ähnlich wie etwa in Marginalkommentaren oder in Scholienpartien; doch kommt eine derartige Ausgestaltung auch in Haupttexten von Handschriften vor, und im Falle der Wiener Fragmente haben die Entzifferung und die Erschließung des Textes eindeutig bewiesen, dass es sich hier um eine Volltext-Abschrift des Werkes handelt.[68] Bemühungen um regelmäßigere und eher runde Formen sind auf dem Doppelblatt 195rv+194rv (Abb. 3a)[69] wesentlich deutlicher, und es lässt sich eine gewisse Tendenz zu einem anspruchsvolleren Perlschrift-Modell beobachten; die Majuskelformen werden bei einigen Buchstaben wie Eta, Epsilon, Theta, Lambda, Kappa ausgewogen neben den Minuskelformen verwendet, während sie bei anderen Buchstaben wie Ny, Pi, Gamma, Sigma, Delta nur vereinzelt vorkommen (Beta ist immer in Minuskelform, bis auf die Initiale auf f. 194r). Auf dem anderen Doppelblatt, ff. 192v+193r (Abb. 3b), steigen die Variationen in der Schrift-

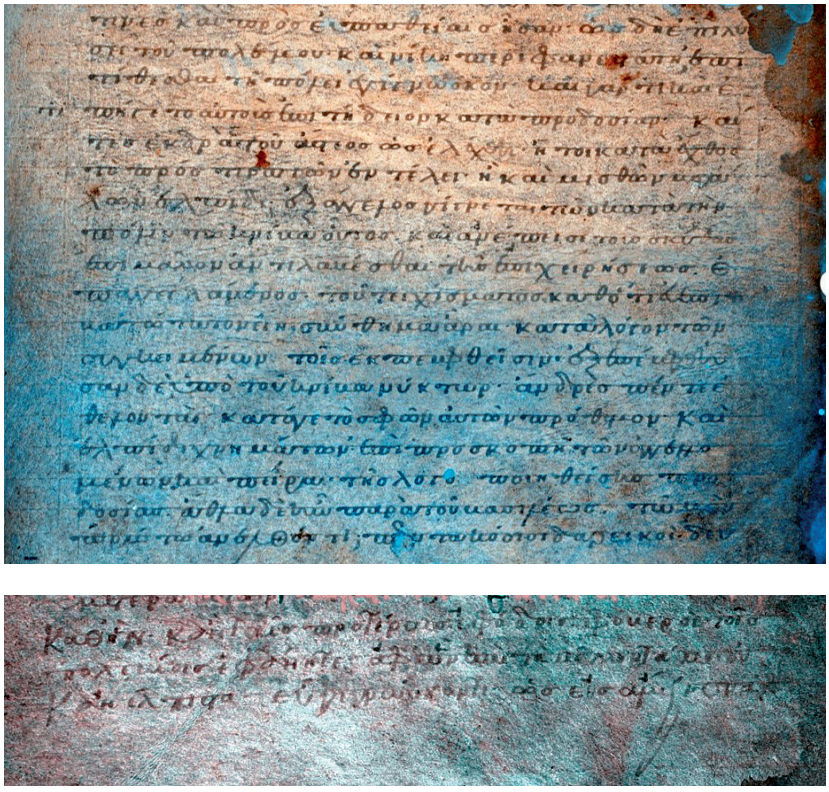

Abb. 3: ÖNB, Codex hist. gr. 73: *Scythica Vindobonensia*
(a) f. 195r, Z. 13–30, und (b) f. 193r, Z. 28–30 (durch die obere Schrift nicht gedeckte Textteile)
Spectral imaging by EMEL (2013), processed images by David Kelbe
(© ÖAW-Projekt FWF P 24523-G19 „Wichtige Textzeugen in Wiener griechischen Palimpsesten")

[67] Da an der Wiedergewinnung der zwei der acht erhaltenen Seiten des Dexippos-Codex noch gearbeitet wird, sind die folgenden Ausführungen noch nicht als definitiv zu betrachten. Siehe auch die Beobachtungen von G. De Gregorio, E. Gamillscheg, J. Grusková, O. Kresten, G. Martin, B. Mondrain und N. Wilson in De Gregorio *et al.*, Palaeographical and Codicological Remarks, 5–13 (mit Abb. 1–6 auf Seiten 551–556 des Bandes „Empire in Crisis").

[68] D.h. nicht um Fragmente aus einer Exzerpten-Sammlung wie jene des Konstantinos VII. Porphyrogennetos, der wir die sonstige Dexippos-Überlieferung verdanken. Siehe dazu die in Anm. 60 zitierten Beiträge von Gunther Martin und Jana Grusková.

[69] Zur chronologischen Einordnung der Fragmente siehe Martin und Grusková, Vorläufige Transkription, 544.

führung und in der Größe einzelner Buchstaben an, und es fällt eine etwas häufigere Verwendung von Majuskelformen auf; generell ist hier die Tendenz zu einem unregelmäßigeren, weniger anspruchsvollen Modell zu sehen. Doch handelt es sich bei den beiden Doppelblättern zweifellos um ein und denselben Kopisten, der seinen Text auf ff. 195rv+194rv disziplinierter und gleichmäßiger gestaltete, während er auf ff. 192v+193r lockerer schrieb. Eine Tendenz zur zunehmenden Lockerung in der Schrift lässt sich generell in späteren Teilen ein und derselben Handschrift beobachten. Dies würde darauf hinweisen, dass sich ff. 195rv+194rv eher am Beginn des originalen Dexippos-Codex befanden, ff. 192v+193r hingegen in einem späteren Teil.[70]

Da die vier Blätter keine Subskription des Kopisten tragen, muss die Datierung der Schrift auf der Grundlage einer paläographischen Analyse erfolgen, die sich auf den Vergleich mit datierten Handschriften stützt. Als mögliche Vergleichsmaterialien könnte man folgende datierte Stücke anführen: Codex Paris. gr. 223 (*Diktyon* 49794) ist ein Beispiel aus dem Jahr 1045, wobei etwa auf das Scholion am Ende der Katene zu den Paulus-Briefen (z.B. f. 273v) hingewiesen werden kann;[71] Codex Paris. gr. 1068 (*Diktyon* 50663) ist ein im Jahre 1044 subskribierter Klimax-Codex mit einem kursiveren Duktus (z.B. ff. 217v–218r);[72] schließlich kann man hier den ins Jahr 1056 datierten Codex Paris. Coislin 28 (*Diktyon* 49170) erwähnen, wobei die Schrift des Randkommentars (z.B. f. 269v) eine mögliche Parallele bietet (z.B. das für diese Zeit auffällige nabelförmige Theta).[73] Eine gewisse Ähnlichkeit kann man auch in der Schrift des Codex Oxon. Auct. T.2.2 (Bodleian Library, *Diktyon* 47150) aus dem Jahre 1067[74] oder in jener des im Jahre 1042 von einem Anonymus geschriebenen Codex Oxon. Barocci 196 (Bodleian Library, *Diktyon* 47483) sehen.[75] Jedenfalls handelt es sich bei dem Kopisten, dem wir die Wiener Fragmente der *Scythica* von Dexippos verdanken, um einen nicht nur geübten, sondern offensichtlich auch gelehrten Schreiber, der sein Buchexemplar des historischen Textes mit gewisser Sorgfalt und offensichtlichem Interesse für den Inhalt angefertigt hat.[76] Was die Datierung und die Lokalisierung anbelangt, so kann man also die Dexippos-Handschrift einerseits in die Mitte bis zweite Hälfte des 11. Jahrhunderts einordnen, andererseits mit höchster Wahrscheinlichkeit in eine östliche Region des griechischen mittelalterlichen Sprachgebiets verweisen.[77]

Zur oberen Schrift der vier palimpsestierten Dexippos-Blätter ist zu bemerken, dass sie – laut einer zuzustimmenden Aussage von Rudolf Stefec[78] – zahlreiche Merkmale des späten, hier wohl in die erste Hälfte des 13. Jahrhunderts zu datierenden zypriotisch-palästinensischen Stils „Epsilon" aufweist, wobei die zwei Texte, auf ff. 192r–193r (*Descriptio constitutionis monasterii Studii* des Theodoros Studites) und ff. 193v–194v (Gebete), von zwei verschiedenen Händen geschrieben wurden (Abb. 4a und 4b).[79]

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[70] Siehe dazu die Beobachtungen von G. De Gregorio, E. Gamillscheg, J. Grusková, O. Kresten, G. Martin, B. Mondrain und N. Wilson in De Gregorio *et al.*, Palaeographical and Codicological Remarks, 9: „Fols. ‚192v' and ‚193r' (Figs. 5 and 6) display more cursive elements, but still seem to be written by the same scribe whose movements became faster (perhaps towards the later parts of the manuscript) resulting in a more relaxed, more informal and more flowing script."

[71] Cf. Lake und Lake IV, No. 157, plate 267; RGK II, Nr. 179, Taf. 99; siehe die Bilder unter https://gallica.bnf.fr/ark:/12148/btv1b55006070n.image (abgerufen am 28.11.2020).

[72] Cf. Lake und Lake IV, No. 156, plate 266; RGK II, Nr. 524, Taf. 306; siehe die Bilder unter https://gallica.bnf.fr/ark:/12148/btv1b10724000k.image (abgerufen am 28.11.2020).

[73] Cf. Lake und Lake IV, No. 164, plate 280; RGK II, Nr. 453, Taf. 258; siehe die Bilder unter https://gallica.bnf.fr/ark:/12148/btv1b10038000b.image (abgerufen am 28.11.2020).

[74] Wilson, *Mediaeval Greek Bookhands* I, 20; II, plates 31–32; Lake und Lake II, No. 58, plates 106–107. RGK I, Nr. 82.

[75] Cf. Lake und Lake II, No. 56, plates 103–104. Digitalisat bei: https://digital.bodleian.ox.ac.uk (abgerufen am 28.11.2020).

[76] Siehe dazu die Beobachtungen von G. De Gregorio, E. Gamillscheg, J. Grusková, O. Kresten, G. Martin, B. Mondrain und N. Wilson in De Gregorio *et al.*, Palaeographical and Codicological Remarks, 10.

[77] Siehe dazu die Beobachtungen von G. De Gregorio, E. Gamillscheg, J. Grusková, O. Kresten, G. Martin, B. Mondrain und N. Wilson in De Gregorio *et al.*, Palaeographical and Codicological Remarks, 11: „It is a legitimate assumption that the Vienna manuscript could have been produced in Constantinople or its environs, since that is where the need for a new copy of the historical work in question could have arisen, i.e. in the erudite environment of the capital, and where, simultaneously, the potential owner of a new copy was most likely to find a manuscript exemplar for transcription (Vorlage). Still, one should not forget that scholars used to travel and so did valuable manuscripts alongside their owners."

[78] Stefec, Anmerkungen, 136–137.

[79] Siehe dazu die Beobachtungen von G. De Gregorio, E. Gamillscheg, J. Grusková, O. Kresten, G. Martin, B. Mondrain und N. Wilson in De Gregorio *et al.*, Palaeographical and Codicological Remarks, 6. Zu den Gebeten siehe oben Anm. 54.

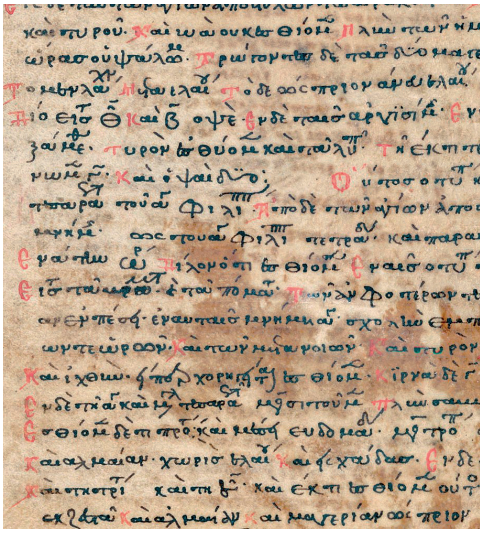

Abb. 4a: ÖNB, Codex hist. gr. 73, f. 192r

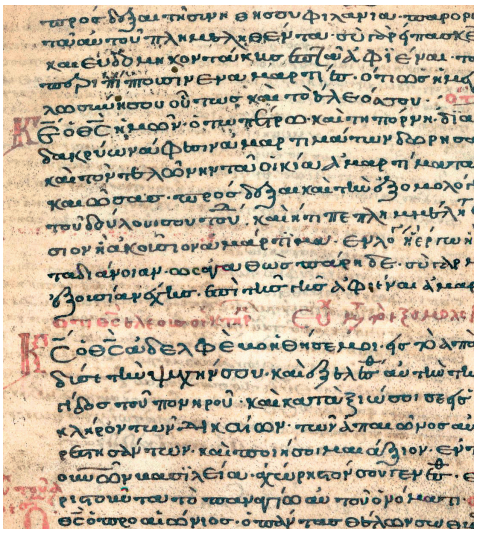

Abb. 4b: ÖNB, Codex hist. gr. 73, f. 194r

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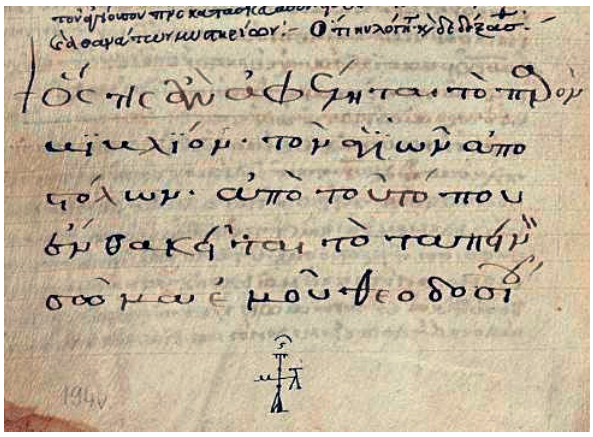
Das einzige sichere Zwischenglied aus der Geschichte des Codex zwischen der Entstehung des palimpsestierten Zusatzteils im 13. Jahrhundert und dem Ankauf durch Ogier Ghislain de Busbecq im 16. Jahrhundert, durch den der Codex an die Wiener Hofbibliothek kam, ist ein ausführlicher Bücherfluch auf den Dexippos-Blättern 194v–195r (Abb. 5): „Derjenige, der dieses Buch der Heiligen Apostel von dem Platz, wo mein, des Theodosios Πρίγκιψ, bescheidener Körper liegt, entfernt, möge der unauflöslichen Exkommunikation durch Vater, Sohn und Heiligen Geist unterliegen und das Schicksal des Verräters Judas erleiden“.[80]



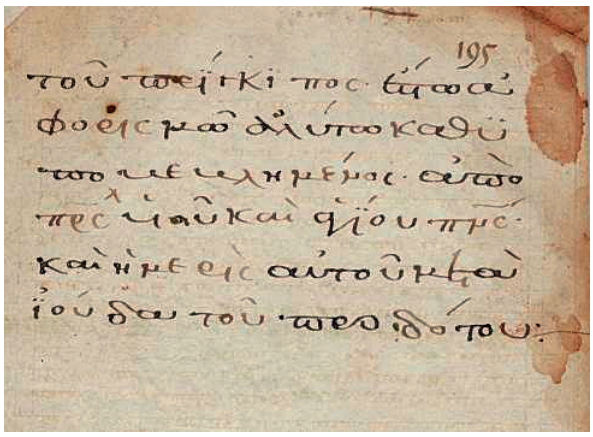


Abb. 5: ÖNB, Codex hist. gr. 73, f. 194v unten und f. 195r oben: Bücherfluch des Theodosios Πρίγκιψ (13. Jh.)

(© ÖAW-Projekt FWF P 24523-G19 „Wichtige Textzeugen in Wiener griechischen Palimpsesten“)

„Theodosios Prinkips“, der Verfasser dieses Bücherfluchs, d.h. einer der Vorbesitzer des gesamten Codex, ist gewiss jener der Familie der Villehardouin entstammende Theodosios, der von 1278 bis 1283 als orthodoxer Patriarch Theodosios IV. von Antiochien belegt ist. Die Familie war mit dem Vierten Kreuzzug von der Champagne in den Osten gekommen und dann im „lateinischen“ Fürstentum (*principatus*) von Achaia heimisch geworden. Theodosios nennt sich hier – wie in einer Reihe anderer Handschriften, die sich in seinem Besitz befanden – Πρίγκιψ. Die Metropole am Orontes lag nach ihrer Eroberung durch den Mamlukensultan

[80] Siehe dazu die Beobachtungen von G. De Gregorio, E. Gamillscheg, J. Grusková, O. Kresten, G. Martin, B. Mondrain und N. Wilson in De Gregorio *et al.*, Palaeographical and Codicological Remarks, 7.

Baibars im Jahre 1268 in Schutt und Asche, und der Sitz des Patriarchen wurde daher nach Damaskus verlegt. Ob Theodosios je diesen Sitz in Damaskus erreicht hat, lässt sich nicht sagen. Auch wissen wir nicht genau, welchen Ort innerhalb des byzantinischen Reiches er als seine letzte Ruhestätte auserwählt hatte, der dann auch für die Aufbewahrung der von ihm gesammelten Handschriften gedient hätte. Das in einem ins 13. Jahrhundert zu datierenden Besitzervermerk (f. 1r) und in einem Monogramm (ff. 1r und 194v, s. Abb. 5) angeführte Kloster der „Unbefleckten (ἀμόλυντος) Gottesmutter (Theotokos)", genannt τοῦ Βώλακος (Cod. Βόλακος), hat wahrscheinlich in Westkleinasien, zwischen Smyrna und Ephesos, gelegen.[81]

III. FRAGMENT DER *CHRONIK* DES EUSEBIOS IM CODEX VIND. IUR. GR. 18

IIIa. Bemerkungen zur Texterschließung und Forschungsgeschichte

Ein weiteres *Unicum* wurde bei der Neubearbeitung der Wiener griechischen Palimpseste im Codex Vind. iur. gr. 18 entdeckt: Es handelt sich um zwei Blätter aus einer wohl im 10. Jahrhundert entstandenen griechischen Handschrift der *Chronik* des Eusebios von Kaisareia.[82]

Der Codex iur. gr. 18 (*Diktyon* 71025) ist eine aus zwei Teilen bestehende juristische Handschrift des 11. Jahrhunderts in einem Kleinformat von 150/155 × 115/120 mm, die im 16. Jahrhundert über die Handschriftensammlung des Johannes Sambucus an die Wiener Hofbibliothek kam.[83] Der zweite Teil, ff. 9–81, für den eine süditalienische Herkunft postuliert wurde,[84] enthält ein Prochiron-Derivat und einige andere juristische Texte. Die Blätter gehörten ursprünglich zu einem ca. 185 Folien umfassenden juristischen Codex, für dessen Herstellung (in dem erhaltenen Bestand) so gut wie ausschließlich palimpsestierte Blätter aus älteren Majuskel- und Minuskelhandschriften (6./7.–11. Jh.) verwendet wurden.[85]

Auf ff. 32rv und 39rv, die ein Doppelblatt bilden,[86] ließen sich bei der genannten Bearbeitung unter UV-Licht Reste eines einspaltig zu 20 Zeilen angeordneten griechischen Textes erkennen. Die entzifferten Textpassagen wiesen gewisse Parallelen zu einigen Stellen in der Ἐκλογὴ χρονογραφίας des Georgios Synkellos auf, wobei der Quellenapparat der kritischen Ausgabe von Alden A. Mosshammer (1984) jeweils auf das erste Buch der *Chronik* des Eusebios verwies. Dieses Buch enthielt eine nach Völkern geordnete, „quellenkritische", auf Exzerpten aus früheren, heute zumeist verlorenen Autoren fußende Studie, in der Eusebios die chronologischen Systeme verschiedener Völker des Altertums erörterte. Es ist aber, abgesehen von indirekten Zitaten bei späteren Autoren wie Georgios Synkellos (8./9. Jh.), nur in einer (nach den Untersuchungen von Armenuhi Drost-Abgarjan) im 5. Jahrhundert entstandenen armenischen Übersetzung erhalten geblieben. Bei einem Vergleich der im Wiener Palimpsest entzifferten Passagen mit dieser armenischen Übersetzung – wobei die digitalen UV-Aufnahmen, die für uns im Jahre 2007 von der TU Wien angefertigt wurden,[87] bei der Textentzifferung sehr geholfen haben – wurde eine inhaltliche Übereinstimmung mit einem Teil des Kapitels „Wie die Chaldäer die Chronik schreiben" in den Unterkapiteln „Über die chaldäische unverbürgte Geschichte: aus des Polyhistor Alexandros dieselben Chaldäer betreffendem Buche" und „Alexandros des Polyhistors <Bericht> von der Sintflut: aus derselben Schrift, von welcher gesprochen ist" (zitiert nach der Übersetzung von Josef Karst 1911[88]) festgestellt. Die Autorin dieser Zeilen hat ihre Entdeckung im Jahre 2010 bekannt gemacht.[89] Der Textanschluss von f. 32v auf f. 39r ließ deutlich erkennen, dass die zwei Blätter im Muttercodex

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[81] Unter Theodosios' Handschriften ist dieses Kloster nur im Wiener Codex belegt. Siehe dazu die Beobachtungen von G. De Gregorio, E. Gamillscheg, J. Grusková, O. Kresten, G. Martin, B. Mondrain und N. Wilson in De Gregorio *et al.*, Palaeographical and Codicological Remarks, 7–8 (mit weiterführenden Literaturhinweisen).

[82] Siehe Grusková, *Untersuchungen*, 149–153; mehr dazu weiter unten. Bei der Katalogisierung des Codex iur. gr. 18 konnte die untere Schrift zwar datiert werden, der Text ließ sich aber nicht entziffern; vgl. Hunger und Kresten, *Katalog* II, 34.

[83] Zum Codex siehe Hunger und Kresten, *Katalog* II, 33–34; Grusková, *Untersuchungen*, 130–169 (mit weiterführenden Literaturhinweisen), 219–245 (Abb. 46–72).

[84] Vgl. dazu Cavallo, La circolazione, 87–136 (94–95, 108, 118 mit Abb. von f. 59r).

[85] Zu weiteren Details siehe Grusková, *Untersuchungen*, 130–169, 219–245 (Abb. 46–72).

[86] Die beiden Folien wurden später am gesamten äußeren Rand um 15–20 mm verkleinert.

[87] Vgl. oben S. 319 mit Anm. 10.

[88] Benutzt wurden auch die lateinischen Übersetzungen von Heinrich Petermann (1875) und von Johannes Baptista Aucher (1818). Da Hieronymus nur das zweite Buch der *Chronik* des Eusebios ins Lateinische übersetzt hat, kam seine Übersetzung nicht zur Hilfe.

[89] Siehe Grusková, *Untersuchungen*, 26, 131, 149–153. Zum ersten Mal habe ich das neue Fragment an der internationalen Tagung

das mittlere Doppelblatt einer Lage bildeten.[90] Es handelt sich dabei um ein insgesamt 80 kurze Textzeilen umfassendes Fragment, das entweder aus einer Kopie der originalen griechischen Fassung der *Chronik* des Eusebios oder aus der von Mosshammer vermuteten gemeinsamen Vorlage der armenischen Übersetzung und der bei Georgios Synkellos erhaltenen Exzerpte gestammt haben dürfte.[91]

Im Rahmen des oben genannten FWF-Projekts „Wichtige Textzeugen in Wiener griechischen Palimpsesten" der ÖAW wurden die beiden Blätter im Jahre 2013 durch das technische Team der EMEL multispektral digitalisiert.[92] Während sich die Schrift auf den Fleischseiten verhältnismäßig gut wiedergewinnen ließ (Abb. 7), konnten auf den zwei Haarseiten bisher nur kleinere Textteile lesbar gemacht werden. Neue Bemühungen werden unternommen, um weitere Fortschritte zu erreichen. Zu einer tieferen Erschließung des Fragments im Rahmen der chronographischen Tradition haben Jana Grusková und Otto Kresten im Jahre 2015 Olivier Gengler zur Kooperation eingeladen.[93]

IIIb. Paläographische Bemerkungen

Der Schreibort des oberen juristischen Textes auf ff. 9–81 des Codex Vind. iur. gr. 18[94] ist mit Sicherheit Kalabrien (Abb. 6). Der Codex wurde bereits im Katalog von Herbert Hunger und Otto Kresten und später auch von Guglielmo Cavallo ins 11. Jahrhundert datiert;[95] Letzterer hat auch eine Lokalisierung nach Unteritalien (Kalabrien) auf Grund des verwendeten Schriftstils „en as de pique" vorgeschlagen, eine Graphie, die eben in diesem Raum – hauptsächlich Kalabrien (es wird aber auch eine mögliche Ausstrahlung in andere Gebiete Süditaliens vermutet) – etwa ab Mitte des 10. bis Mitte des 11. Jahrhunderts zu finden ist. Es handelt sich um eine etwas ruhigere (gelegentlich steife) Ausformung dieser aus einer Mischung von kursiveren und kalligraphischeren Elementen bestehenden italogriechischen Stilisierung, die meines Erachtens chronologisch nicht über den Anfang des 11. Jahrhunderts hinaus einzuordnen ist.

Abb. 6: ÖNB, Codex iur. gr. 18, ff. 32v–33r
(© ÖAW-Projekt „Griechische Palimpseste")

„Handschriften- und Textforschung heute" im April 2010 in Hamburg kurz vorgestellt, siehe dazu oben Anm. 55.

90 Zu weiteren Details siehe Grusková, Zur Textgeschichte; Grusková, *Untersuchungen*, 149–153 (mit einer Arbeitstranskription von f. 32v u. f. 39r), 234–235 (Abb. 61–62: ff. 32v, 39r).

91 Vgl. Grusková, Zur Textgeschichte, 48–49.

92 Zum Projekt siehe oben mit Anm. 11 und Grusková, Further Steps, bes. 77–79. Es handelt sich um dieselbe Digitalisierungskampagne, bei der auch die Dexippos-Blätter aufgenommen wurden; siehe dazu IIa.

93 Die Ergebnisse werden von Jana Grusková und Olivier Gengler in einem Aufsatz veröffentlicht werden.

94 Zum Codex siehe Anm. 83.

95 Siehe Hunger und Kresten, *Katalog* II, 33–34; Cavallo, La circolazione, 87–136 (94–95; 108; 118 mit Abb. von f. 59r).

Hier sollen nur einige Beispiele für diesen Schrifttyp genannt werden: der kalligraphischere Codex Laur. Plut. 9.15 (*Diktyon* 16103, aus dem Jahre 963/964, lokalisiert in Africo, Südkalabrien) (z.B. f. 167r);[96] weiterhin der Codex Vat. gr. 1553 mit Werken des Ioannes Damaskenos (*Diktyon* 68184), ebenfalls aus der zweiten Hälfte des 10. Jahrhunderts (z.B. f. 120r);[97] der weitgehend aus reskribierten Teilen bestehende Codex Vat. gr. 1456 (*Diktyon* 68087) aus zweiter Hälfte/Ende des 10. bzw. vom Anfang des 11. Jahrhunderts, der sicherlich aus dem Süden Kalabriens (vielleicht Reggio) entstammt und unter anderem das *Onomastikon* des Eusebios (z.B. auf f. 3r) enthält;[98] schließlich das jüngste datierte „as-de-pique"-Beispiel, der Codex Paris. suppl. gr. 911 (*Diktyon* 53595), eine ins Jahr 1043 datierte griechisch-arabische Evangelienhandschrift wahrscheinlich sizilianischen (oder gar südkalabrischen) Ursprungs (z.B. ff. 266v–267r).[99] Die Tatsache, dass für den in ff. 9–81 erhaltenen Teil des juristischen Codex Blätter aus elf (vielleicht sogar zwölf) älteren Majuskel- und Minuskel-Codices vom 6./7. bis 11. Jahrhundert wiederverwendet wurden,[100] lässt deutlich darauf schließen, dass dieser ohne höhere buchtechnische Ansprüche auf wiederverwendetem Pergament geschriebene Codex wahrscheinlich für die Benutzung in einem engeren juristischen Kreis bestimmt war. Bei einer derartig bunten Mischung von Pergamentblättern aus so vielen älteren Handschriften, die hier für einen profanen Text wiederverwendet wurden, liegt die Vermutung nahe, dass das Pergament (bzw. mindestens ein Teil davon) im Handel gekauft sein könnte.[101]

Wenige Dezennien vor der Entstehung des oberen juristischen Codex und damit der Wiederverwendung der Blätter entstand die originale Mutterhandschrift, aus welcher jetzt dank der Arbeit von Jana Grusková die Reste von Buch 1 der *Chronik* des Eusebios ans Licht gekommen sind (Abb. 7): Ihre Entstehung lässt sich ungefähr in die Mitte bis zweite Hälfte des 10. Jahrhunderts datieren.[102] Es ist eine wohl kursivere und lockere Form des „as-de-pique"-Stils, welche die charakteristischen Elemente aufzeigt – nicht nur die wohlbekannte, der antiken Urkundenkursive entstammende Ligatur Epsilon-Rho, sondern auch die markante Verdoppelung der ersten Haste bei Kappa, gelegentlich auch bei Eta, das rechtsgeneigte Lambda mit dem ersten, sehr ausgedehnten Zug und schließlich das kursive, ebenfalls rechtsgeneigte Ny.

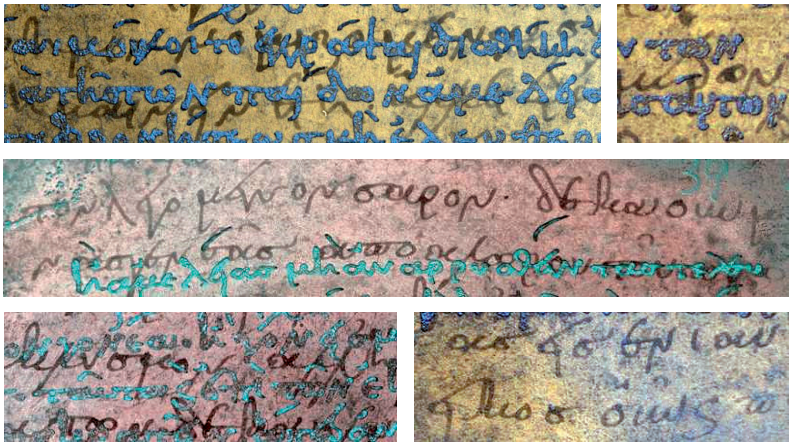

Abb. 7: ÖNB, Codex iur. gr. 18, ff. 32v und 39r (Details), Eusebios, *Chronik* (Buch 1)
Multispektralaufnahmen von EMEL (2013), „image processing" durch David Kelbe
(© ÖAW-Projekt FWF P 24523-G19 „Wichtige Textzeugen in Wiener griechischen Palimpsesten")

[96] Digitalisat bei: http://mss.bmlonline.it/Catalogo.aspx?Shelfmark=Plut.9.15 (abgerufen am 28.11.2020).
[97] Digitalisat bei: https://digi.vatlib.it/view/MSS_Vat.gr.1553 (abgerufen am 28.11.2020).
[98] Digitalisat bei: https://digi.vatlib.it/view/MSS_Vat.gr.1456 (abgerufen am 28.11.2020).
[99] RGK II, Nr. 155, Taf. 83; Digitalisat bei: https://gallica.bnf.fr/ark:/12148/btv1b110040650.
[100] Siehe Grusková, *Untersuchungen*, 130–131, 138–169 (mit weiterführenden Literaturhinweisen), 230–245 (Abb. 57–72).
[101] Das Pergament war im 10.–11. Jahrhundert der wichtigste Beschreibstoff und konnte gekauft werden; vgl. z.B. die *Vita* des Neilos von Rossano, Kap. 32, p. 78 Giovanelli (siehe Giovanelli, Βίος). Billigeres Pergament minderer Qualität stellten dabei beschädigte bzw. palimpsestierte, d.h. nach der Entfernung der originalen Schrift zur Wiederverwendung vorbereitete Blätter dar.
[102] Vgl. Grusková, *Untersuchungen*, 150 (und 234–235 mit Abb. 61–62): „Den Haupttext beider Blätter hat eine einzige in die 2. Hälfte des 10. Jahrhunderts datierbare Minuskelhand geschrieben; eine italo-griechische Herkunft scheint möglich (vgl. Abb. 61: f. 32v; Abb. 62: f. 39r). Iota mutum wird stellenweise geschrieben (vgl. 39r, Z. 16). Akzente und Spiritus lassen sich stellenweise erkennen." Zu weiteren Details siehe ebenda, 149–151.

Der Schriftspiegel des einspaltig zu 20 Zeilen pro Seite gestalteten Eusebios-Textes ist – analog zu dem Format der Handschrift – sehr klein. Es scheint, dass sich der Schreiber mit seiner informellen, eher persönlichen Schrift an keine (blind gezogenen) Zeilenlinien gehalten hat. Eine Neigung zu einer gewissen Disziplinlosigkeit lässt sich auch in der Ausformung einzelner Buchstaben feststellen. Demzufolge liegt die Vermutung nahe, dass es sich im Wiener Doppelblatt um eine private Kopie der *Chronik* von Eusebios (bzw. zumindest des betreffenden Teils) handelt; von einem kalligraphischen Buchexemplar kann hier jedenfalls keine Rede sein.

Eine genauere Datierung und Lokalisierung der griechischen Eusebios-Handschrift, aus der das Wiener Doppelblatt stammt, ist nicht nur für die Textüberlieferung der *Chronik* von großer Bedeutung, sondern auch für die reiche chronographische Tradition. Diesbezüglich ergeben sich einige Fragen:[103]

1. Kann die Schrift unseres Fragments nach Süditalien lokalisiert werden? Die Antwort ist: ja, sie kann. In diesem Falle hätten wir im Wiener Bruchstück ein ganz frühes Beispiel der genannten „as-de-pique"-Stilisierung, das aber doch noch ins 10. Jahrhundert zu datieren wäre.

2. Lässt sich als Entstehungsort der Eusebios-Handschrift ein Gebiet des byzantinischen Ostens vollkommen ausschließen, und wenn nicht, konnte die Handschrift in einer so kurzen Zeit nach Süditalien gebracht werden, d.h. innerhalb von etwa 30–40 Jahren den Ort wechseln? Handschriften konnten reisen, manchmal sogar bald nach ihrer Entstehung. Die vergleichbaren Handschriftenbelege weisen darauf hin, dass wir es hier eventuell auch mit einer Handschrift in früher Minuskel (Mitte/zweite Hälfte des 9. Jh.) zu tun haben könnten, die im Osten entstand[104] und nach einigen Dezennien den Weg nach Kalabrien fand. Allerdings: Eine derartige, in den byzantinischen Osten verweisende Hypothese hat eine weitaus geringere Wahrscheinlichkeit.

3. Wäre es plausibel anzunehmen, dass im traditionellen kulturellen Milieu des süditalienisch-kalabrischen Mönchstums im 10. Jahrhundert ein Gelehrter für seinen eigenen Bedarf eine Abschrift der eusebischen *Chronik* (bzw. des ersten Buches oder eines Teils davon) angefertigt hat? Und könnte es überhaupt möglich gewesen sein, zu jener Zeit in Süditalien eine ältere Handschrift der *Chronik* zu finden, die als Vorlage für eine Abschrift diente? Auch wenn dies im Vergleich zur Hauptstadt des byzantinischen Reiches, die in Verbindung mit den chronographischen Werken des Ioannes Malalas (6. Jh.) und des Georgios Synkellos (8./9. Jh.) steht, viel weniger wahrscheinlich ist, lässt sich eine derartige Möglichkeit in beiden Fällen nicht ausschließen, zumal das Werk des Eusebios vielmehr für Computus-Fragen zur Bestimmung der Jesus-Daten benützt wurde und allgemein mit der Computus-Literatur in Verbindung gesehen werden sollte; dies würde nach Süditalien gut passen. Fragen muss man sich allerdings auch, ob ein Gelehrter aus Süditalien seine Abschrift nicht auf Reisen in den Osten des byzantinischen Reiches angefertigt haben könnte; in den Kulturzentren des Ostens war es zweifellos viel wahrscheinlicher, dass eine alte griechische Handschrift der *Chronik* des Eusebios überlebt haben könnte.

Sollte die Hypothese einer süditalienischen Herkunft des Eusebios-Fragments bestätigt werden, dann hätten wir ein weiteres Indiz für das Fortleben von Texttraditionen syrisch-palästinensischen Ursprungs auf dem hellenophonen Gebiet der ehemaligen Magna Graecia, und zwar von Traditionen, die im Zentrum Konstantinopel manchmal spurlos verschwunden sind: Eusebios von Kaisareia in Palästina gehörte sicherlich zu den Autoren, welche das Interesse der italo-griechischen Schreibzentren erweckten, wo auch Zeugnisse der christlich-arabischen Kultur aufzuspüren sind, wie etwa der bereits erwähnte, aus drei griechischen Majuskel-Mutterhandschriften und einem arabischen Manuskript zusammengesetzte Palimpsest-Codex Vat. gr. 1456 mit dem *Onomastikon* des Eusebios zeigt.

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[103] Ähnlich äußert sich Paul Canart (46*–47*, bes. 47*) zur unteren Schrift zweier anderer Blätter (ff. 48 und 53) des Codex Vind. iur. gr. 18, die analoge Charakteristika aufweisen. – Für einen Gedankenaustausch zum Inhalt der Eusebios-Chronik und zur möglichen Ausbreitung in Süditalien danke ich Christian Gastgeber.

[104] Vgl. etwa den älteren Teil im Codex Paris. gr. 1049 (*Diktyon* 50643): De Gregorio, Materiali vecchi e nuovi, 143–145 mit Abb. 24–26; Digitalisat bei: https://gallica.bnf.fr/ark:/12148/btv1b10721668w (abgerufen am 28.11.2020). Eine sehr gelehrte, jedoch nur informative zusammenfassende Studie zum as-de-pique-Stil bietet neulich Crisci, La scrittura ad "asso di picche".

IV. FRAGMENTE EINER ALTEN *BASILIKEN*-HANDSCHRIFT IM CODEX VIND. SUPPL. GR. 200

IVa. Bemerkungen zur Texterschließung und Forschungsgeschichte

Der erst im Jahre 1986 an die ÖNB gekommene Codex Vind. suppl. gr. 200 (*Diktyon* 71664) mit einem Format von ca. 280 × 220 mm enthält in seinem Hauptteil (ff. 49r–208v) ein im 11. Jahrhundert kopiertes und illuminiertes Evangelienlektionar.[105] Im 12. Jahrhundert wurden zu dem bereits damals am Beginn verstümmelten Codex 48 palimpsestierte Blätter hinzugefügt, ff. 1–48, um den Textverlust zu ergänzen.[106] Zum Inhalt der unteren Schrift finden sich im Katalog aus dem Jahre 1994 keine näheren Angaben.[107] Bei einer in den Jahren 2003–2004 von der Autorin dieser Zeilen (im Rahmen des EU-Projekts „Rinascimento virtuale") durchgeführten Neuuntersuchung ließ sich feststellen, dass alle 48 Blätter einem einzigen älteren Codex der *Basiliken* – des ausführlichsten gesetzgeberischen Werkes des byzantinischen Rechts, das 60 Bücher umfasste – entstammen.[108] Mit einer rechtshistorischen Analyse des Neufundes wurde Bernard Stolte (Universität Groningen) betraut. Gleich bei der Untersuchung der ersten entzifferten Teile wurde klar, dass es sich um einen wichtigen Textzeugen der genannten byzantinischen Rechtssammlung handelt. Grusková, die diese Entdeckung bei der Tagung „Non-literary palimpsests: legal texts" an der Universität Groningen im Juni 2004 bekannt gemacht hat, und Stolte haben das Palimpsest in den Jahren 2005–2008 weiter untersucht. Zu diesem Zweck ließ die damalige Kommission für Byzantinistik der ÖAW (Otto Kresten) in Zusammenarbeit mit der Universität Groningen (Bernard Stolte) das Palimpsest unter UV-Licht von der Technischen Universität Wien digital aufnehmen.[109] Bei der genannten Untersuchung, deren ersten Ergebnisse bei der internationalen Tagung „Quellen zur byzantinischen Rechtspraxis" in Wien im Jahre 2007 und in dem dazugehörigen Tagungsband präsentiert wurden, gelang es einerseits, den Inhalt einzelner Blätter zu identifizieren und die damals sichtbaren Textteile zu entziffern, andererseits wurde eine erste paläographische und kodikologische Erfassung der 48 Blätter durchgeführt, woraus sich eine Rekonstruktion der originalen Handschrift ergab.[110] Bernard Stolte hat dann die gewonnenen Teile der Handschrift einer genauen rechtshistorischen Analyse unterzogen, die zu wichtigen Beobachtungen über die Bedeutung des neuen Textzeugen führte.[111]

Auf den heute noch vorhandenen 22 Doppel- und vier Einzelblättern des alten *Basiliken*-Codex sind Bruchstücke aus den Büchern XXI–XXVI und XXVIII–XXIX erhalten geblieben.[112] Der einspaltig angeordnete Text ist nur sehr fragmentarisch lesbar, da er nicht nur gründlich getilgt, sondern auch durch die obere Schrift weitgehend überdeckt wurde. Darüber hinaus sind bei der Wiederverwendung und Beschneidung der Blätter auf das neue Format immer ca. fünf bis acht Textzeilen verloren gegangen, entweder von dem oberen oder von dem unteren Teil der jeweiligen Seite. Die ursprüngliche Zeilenzahl mag ca. 35–36 Zeilen pro Seite gewesen sein. Der Rekonstruktion zufolge handelt es sich bei den Lagen um Quaternionen, die unter Beachtung der *lex Gregory* zusammengesetzt wurden. Der Kopist hat sich offensichtlich bemüht, ein neues Buch jeweils mit

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[105] Zum Codex vgl. Hunger und Hannick, *Katalog* IV, 360–366; Grusková, Zwei neue Basiliken-Handschriften I, 107, 123–132, 135–138 (Tabelle III und IV), 167–182 (Tafeln).

[106] Die Ergänzungsblätter 1r–48v bilden im neuen Codex sechs Quaternionen, in denen die *lex Gregory* beachtet wurde. Auf f. 48v musste der Kopist des oberen Textes seine Schrift ‚strecken', um den richtigen Anschluss zu treffen. Die Beschneidung ist nicht gleichmäßig erfolgt. Im Pergament befinden sich stellenweise gerade Risse, manchmal mit Fischgrätenstich sorgfältig genäht; Löcher sind nicht immer gefüllt; siehe dazu Hunger und Hannick, *Katalog* IV, 360, 365–366.

[107] Eine im Katalog angekündigte Studie von Otto Mazal zum Palimpsest ist nie erschienen.

[108] Grusková, Zwei neuentdeckte Basiliken-Handschriften, 47.

[109] Die Digitalisierung fand im Jahre 2005 an der ÖNB statt. Es wurden ganzseitige UV-Fluoreszenz-Aufnahmen und UV-Reflektographie-Aufnahmen und Teilaufnahmen (vier pro Seite) in UV-Reflektographie angefertigt. Robert Sablatnig, Paul Kammerer und Ernestine Zolda sei dafür an dieser Stelle herzlich gedankt.

[110] Siehe Grusková, Zwei neue Basiliken-Handschriften I, 107, 123–132, 135–138 (Tabelle III und IV), 167–182 (Tafeln).

[111] Siehe Stolte, Zwei neue Basiliken-Handschriften II, 139, 146–151, 167–182 (Tafeln); Stolte, Balancing Byzantine Law, 63.

[112] Die ursprüngliche Reihenfolge der Blätter ist ff. 12vr, 13vr, 38rv, 35rv, 2rv, 7rv, 45vr, 44vr, 11rv, 40vr, 1vr, 8vr, 33vr, 14vr, 31vr, 25vr, 32vr, 26vr, 22rv, 19rv, 16vr, 30rv, 27rv, 9vr, 36rv, 37rv, 21vr, 20vr, 3vr, 6vr, 42rv, 47rv, 28vr, 29vr, 39rv, 5rv, 4rv, 34rv, 48vr, 41vr, 24rv, 43vr, 46vr, 17rv, 18vr, 10rv, 15rv, 23vr; siehe dazu Grusková, Zwei neue Basiliken-Handschriften I, bes. 135–137 (Tabelle III) und 138 (Tabelle IV).

einer neuen Lage bzw. zumindest mit einem neuen Blatt anzufangen. Die originale *Basiliken*-Handschrift dürfte ursprünglich mindestens 234 Folien in 30 Lagen umfasst haben.[113]

In der systematischen Erschließung des Palimpsests wurden in den letzten Jahren mit Hilfe neuer – im Rahmen des CIMA-Projekts (2015–2016) mit einer Nikon-Kamera und einer Hamamatsu-Kamera durch Fabian Hollaus vom Institute of Visual Computing and Human-Centered Technology der TU Wien erstellter – Aufnahmen weitere Fortschritte erreicht.[114] Einblicke darin werden in dem Beitrag von Bernard Stolte in diesem Band präsentiert. Die Entzifferung und Analyse dieser wichtigen juristischen, zum großen Teil immer noch unlesbaren Handschrift wird Schritt für Schritt weitergeführt. Die jüngsten Entwicklungen der digitalen Aufnahmetechnik lassen dabei auf neue Fortschritte hoffen.[115]

IVb. Paläographische Bemerkungen

Hier eine Übersicht *in rebus palaeographicis* des Palimpsestes im Codex Vind. suppl. gr. 200.[116] Was die obere Schrift von ff. 1–48 mit dem ergänzten Teil des zweispaltig zu 21–23 Zeilen pro Seite angeordneten Evangelienlektionars anbelangt, so können wir sie problemlos als eine zu runden Formen tendierende und mit einem großen Modul gestaltete, kalligraphische und in manchen Aspekten sogar künstlich ausgestattete Minuskel aus dem 12. Jahrhundert und wahrscheinlich aus dem griechischen Osten charakterisieren. Herbert Hunger hat die Schrift als „senkrechte kalligraphische Minuskel auf dem Weg zum Kanonverfall" bezeichnet.[117]

Was die *Basiliken*-Handschrift betrifft, aus der die 48 Blätter stammen, kann die zeitliche Einordnung dieser kalligraphischen, leicht linksgeneigten und regelmäßigen Minuskel in das 10. Jahrhundert (zweite Hälfte) festgelegt werden (siehe z.B. f. 42v [Abb. 8a], f. 40v [Abb. 8b]).[118] Vorhanden sind noch einige Elemente der formellen Ausgestaltungen aus der ersten Hälfte/Mitte des 10. Jahrhunderts, die Schriftführung ist aber bereits lockerer und flüssiger, wie es auch später zu finden ist; zu vergleichen wäre etwa der Codex Athen. EBE 263 (*Diktyon* 2559) aus dem Jahre 991.[119] Die Handschrift müsste im originalen Zustand ein beachtliches Format von ca. 390 × 250 mm aufgewiesen haben; sie wurde bei der Wiederverwendung mit Textverlust einiger Zeilen verkleinert.[120]

Insgesamt weist die Schrift, die generell „hängt" (d.h. die mittlere Buchstabenhöhe ist unterzeilig orientiert), eine senkrechte Schriftrichtung bzw. eine leichte Linksneigung auf. Es handelt sich um eine reine Minuskel mit Ausnahme der Buchstaben Kappa, Lambda und sehr selten (am Zeilenende) Alpha, die auch in Majuskelformen vorkommen. Gamma erscheint mit spitz zulaufendem Unterkörper, Eta immer in Form eines lateinischen h. Theta wird stets in zwei Zügen geschrieben. Unterlängen und Oberlängen sind ausgewogen, aber nicht sehr ausgeprägt und enden zumeist mit kleinen häkchenförmigen Ansätzen bzw. Abstrichen, ohne dass dabei auf den ersten Blick der Eindruck des „eckigen Hakenstils" entstünde. Die Spiritus sind eckig gestaltet (manchmal in der Form des halbierten Eta), die Akzente sind mäßig groß und nicht übertrieben ausgedehnt. Iota mutum wird nicht geschrieben. Neben den gelegentlichen Kürzungen der *nomina sacra* (vorwiegend πατήρ) kommt öfter die übliche καί-Kürzung und spärlicher die ν-Kürzung am Zeilenende vor. Für Überschriften und Zahlzeichen wird eine an die konstantinopolitanische Auszeichnungsmajuskel angelehnte

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113 Mehr dazu bei Grusková, Zwei neue Basiliken-Handschriften I, 123–132, 135–138.

114 Die Bilder ermöglichen neue Entzifferungsfortschritte. Größere Teile des unteren Textes bleiben jedoch weiterhin unlesbar. Siehe dazu die folgende Anmerkung.

115 Ein neues Projekt dazu ist in Vorbereitung.

116 Siehe dazu auch Grusková, Zwei neue Basiliken-Handschriften I, 123–132, mit Abbildungen auf 167–182.

117 Siehe Hunger und Hannick, *Katalog* IV, 365: „Weithin stören übergroße Buchstaben das einheitliche Bild (dreierförmiges Zeta, Omega, Majuskel-Sigma, Phi u. a.). Epsilon-Xi gelegentlich mit doppeltem Ansatz. Rho-Ligaturen oft mit stark abwärts hängenden Unterlängen. Neigung zur Überschreitung des Schriftspiegels, vor allem in den unteren Freirand. Duktusschwankungen zwischen disziplinierten Überschriften mit Elementen der alexandrinischen Auszeichnungsmajuskel und ‚freizügigen' Partien." Ebenda, 366: „Zierleisten in verschiedenen Farben (ff. 1r und 42r); Überschriften und Rubriken in Karmesinrot; zahlreiche Bandinitialen mit Kombination verschiedener Farben." Zur Datierung findet sich im Katalog jedoch keine Angabe.

118 Vgl. Grusková, Zwei neue Basiliken-Handschriften I, 124: „Die untere Schrift ist eine senkrecht stehende, gelegentlich leicht links geneigte lockere kalligraphische Minuskel guten Niveaus (mit eingesetzten Akzenten, eckigen Spiritus und Interpunktion), die in die zweite Hälfte des 10. Jahrhunderts, eventuell um das Jahr 1000 datiert werden könnte (vgl. Abb. 16–30)."

119 Siehe Lake und Lake I, No. 33, plates 59–60, 63.

120 Siehe dazu Grusková, Zwei neue Basiliken-Handschriften I, 129.

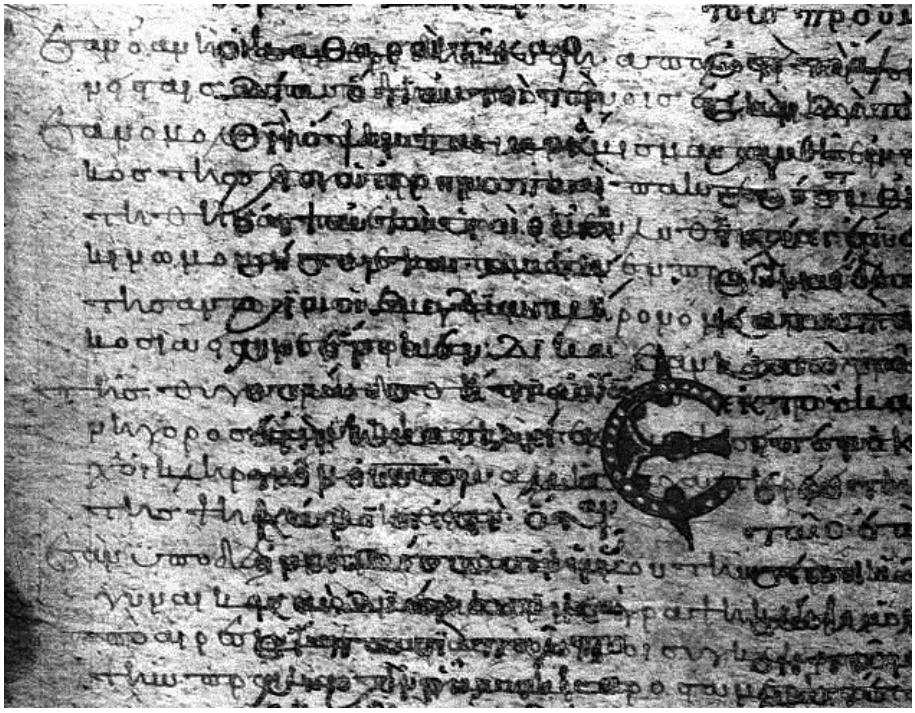

Abb. 8a: ÖNB, Codex suppl. gr. 200, f. 42v
UV Reflectography, digitalisiert von der TU Wien (2005), Paul Kammerer
(© ÖAW-Projekt „Griechische Palimpseste“)

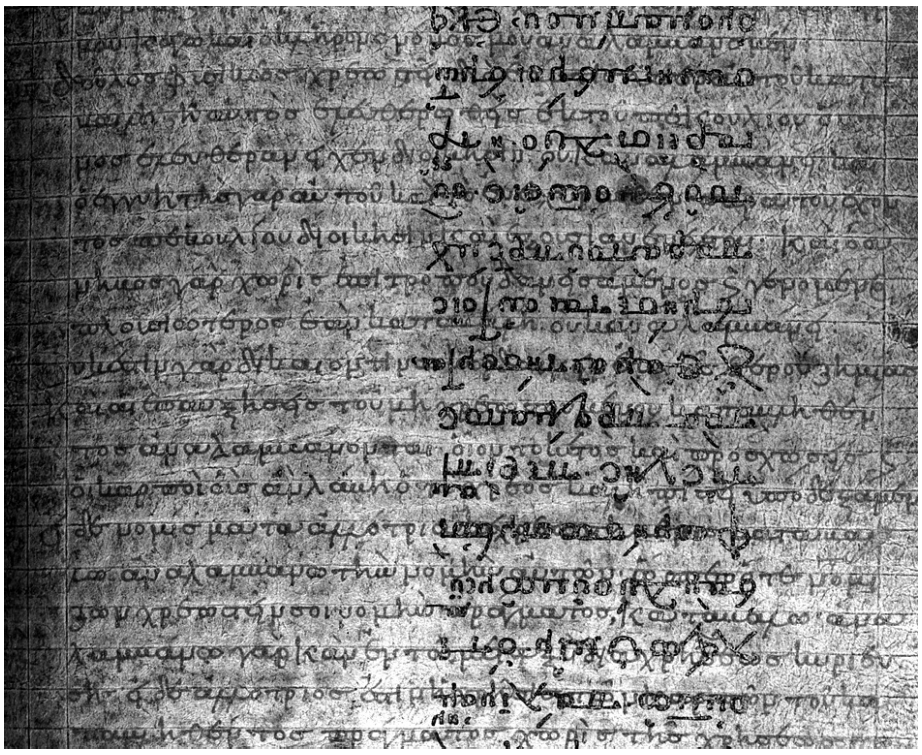

Abb. 8b: ÖNB, Codex suppl. gr. 200, f. 40v
UV Reflectography, digitalisiert von der TU Wien (2005), Paul Kammerer
(© ÖAW-Projekt „Griechische Palimpseste“)

Majuskelschrift verwendet, als Initialen zur Markierung eines neuen Abschnitts kommen leicht vergrößert geschriebene Textbuchstaben vor. Öfter begegnen *termini technici*, die zumeist in lateinischen Buchstaben, stellenweise aber auch in griechischen Buchstaben geschrieben sind, z.B. *mandaton* oder auch μανδάτον, *arbitraria*, *in factum* usw., manchmal sogar in einer gemischten lateinisch-griechischen Schrift- und Sprachform, z.B. *intercessionων*. Der sorgfältig schreibende Kopist scheint nach der Anfertigung seiner Abschrift den Text selbst durchkontrolliert und Fehler korrigiert zu haben.[121]

Das hohe Alter der Wiener *Basiliken*-Handschrift macht die Frage besonders interessant, welchen Text sie uns bietet und in welchem Verhältnis dieser zu den übrigen erhaltenen Textzeugen steht. Gleich die erste rechtshistorische Erschließung ergab, dass die im Codex Vind. suppl. gr. 200 erhaltene Handschrift gegenüber den früher bekannten Textträgern der *Basiliken* eine Sonderstellung einnimmt: „Im allgemeinen hat er auf dem Weg, der von den Texten des sechsten Jahrhunderts zu der späteren Basilikenüberlieferung geführt hat, die Merkmale der älteren Stufen beibehalten, ohne gegen jüngere Einflüsse völlig immun gewesen zu sein. Als solcher ist er ein wertvoller Zeuge, der eine eingehendere Überprüfung verdient".[122]

EPILOG

„Gediegene Kenntnis der Schrift und der Schriftträger, also Paläographie und Kodikologie, sind die ersten und unumgänglichen Voraussetzungen, um bisher unbekannte oder noch nicht bearbeitete Textzeugen zu erfassen und zu publizieren."[123] Mit diesen richtungsweisenden Worten Herbert Hungers kann man abschließend auf das wechselseitige Verhältnis zwischen Palimpsestforschung und Paläographie hinweisen: Die neuen, durch die modernsten Technologien ans Licht gebrachten handschriftlichen Materialien der *scriptiones inferiores* bieten eine wertvolle Fundgrube für die Untersuchung verschiedener schriftgeschichtlicher Phänomene. Ebenso erforderlich ist freilich die Anwendung der präzisesten Methoden der paläographischen Expertise bei der Datierung und Lokalisierung der Mutterhandschriften in den *codices rescripti*, begleitet von einer tiefgreifenden paläographisch-kodikologischen Ausbildung der Nachwuchswissenschaftler, die sich für Palimpseste interessieren: Das sind unverzichtbare Elemente neben der philologischen und kulturhistorischen Ausrüstung.

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Editing the *Basilica* and the Role of Palimpsests. Vind. suppl. gr. 200 and the Transmission of the Early Text

INTRODUCTION

The transmission of the text of the *Basilica*[1] has been precarious, with the result that we possess only three quarters of their sixty books, and those that have been preserved often survive in just one or two manuscripts. Given this state of affairs, any new discovery is welcome. As a brief glance at the history of editing the text will show, progress has often been made through the discovery of palimpsests, and it is fortunate that such discoveries have been made again in recent times in Vienna. It is also very fortunate that the inexorable progress of science, especially in the field of photography, has been such an enormous help in our attempts to read these palimpsests. It is only fitting to thank the experts, and, in the case of the Vind. suppl. gr. 200 (*Diktyon* 71664), especially those of the Technische Universität Wien.[2] Perhaps what follows may encourage them to keep up the good work, for the legal historians have not been idle, either. It is the purpose of this paper to present some provisional results of an exploration of the leaves of this Vienna manuscript.

THE EDITIONS OF THE *BASILICA*

In four centuries, three editions have appeared. For the *editio princeps* (1647), Fabrot used only a handful of manuscripts, all of them in Paris.[3] The second edition by Heimbach (1833–1850) was based on more manuscripts, especially the Coisliniani, now also in the National Library in Paris.[4] For the third edition (1953–1988), Scheltema *cum suis* used a more rigorous editorial method, but another striking difference is the number of palimpsests the editors brought to bear on the constitution of their text.[5] In the thirty years since the publication of the last volume, two further palimpsests have come to light, both in Vienna, on which more below. The collective evidence of these palimpsests, together with the few early manuscripts known to us, has made me think afresh on the early history of the text of what we usually call 'the *Basilica*'.

When Scheltema started preparing a new edition of the *Basilica* he made a fresh collation of all the manuscripts used by Heimbach. Of the sixty books, sixteen had been lost. Fragments had been transmitted in *testimonia*, which were exploited for a partial reconstruction, the *textus restitutus*. Zachariä von Lingenthal

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[1] Edition by Scheltema, Holwerda and Van der Wal, *Basilicorum libri LX*, published 1953–1988. Now also available online: https://referenceworks.brillonline.com/browse/basilica-online, with an unpaginated English preface (2018) in open access on the same site: Stolte, New Praefatio. The latter sets out to make available information dispersed over the Latin prefaces of the 17 volumes of the edition and to present the *modus procedendi* of Scheltema *cum suis*; it does not pretend to replace these prefaces or the other writings to which it repeatedly refers. Its only aim is to provide an easily-accessible overview of the principles on which the edition is based. An identical printed version of this preface has appeared in *Fontes Minores* XIII (2021), whose pagination will be recorded here as well. A more detached consideration of the edition and its predecessors, and some reflections on possible future work, may be found in Stolte, Thirty Years Later.

[2] The new multispectral images were produced and enhanced by Fabian Hollaus (*Centre of Image and Material Analysis in Cultural Heritage* in Vienna—http://hrsm.caa.tuwien.ac.at/, accessed 15.11.2020) as part of the SFHEA-project *Analysis and Conservation of Cultural Heritage—Modern Imaging and Material Analysis Methods for the Visualization, Documentation and Classification of Historical Written Material (Manuscripts)*, financed by the Austrian Federal Ministry of Science, Research and Economy. For additional information on the recovery of this palimpsest, see the contribution by Jana Grusková and Giuseppe De Gregorio in this volume.

[3] Stolte, Thirty Years Later, 168.

[4] Stolte, Thirty Years Later, 175.

[5] Stolte, New Praefatio, section 3.1 (pp. 243–247); see also Stolte, Thirty Years Later, 175–176.

had preceded Scheltema in using one palimpsest, which had come to light in the 19th century, and from which he had edited books XV–XVIII. The manuscript, a codex S. Sepulchri originally from Constantinople, and later in Berlin, was lost during the Second World War and rediscovered only much later in Cracow, where it now carries the shelf-mark 28/266 (*Diktyon* 9101); it had been inaccessible to Scheltema, who nevertheless managed to improve on Zachariä's edition (Π).[6] Unfortunately, no good photographs of this palimpsest are available as yet. In parenthesis, as far as I know this is the only example of a legal text having been erased in order to make place for another legal text.[7] Another palimpsest was discovered at the end of the 19th century, the so-called *Florilegium Ambrosianum*, in the lower layer of part of Ambr. F 106 sup. (*Diktyon* 42771), and was partially edited by Mercati and Ferrini.[8] Strictly speaking it is not a *Basilica* manuscript, but a derivative text, a selection. However, since it covers almost all sixty books it is especially important for the *libri deperditi*, and by reason of its age—10th/11th century—it is in any case a valuable instrument for our knowledge of the shape of the early text. A fresh investigation of this palimpsest by the Groningen editors yielded a number of new readings, which were incorporated into the edition (A). They also made new discoveries in a manuscript of the Vatican Library, Vat. gr. 903 (*Diktyon* 67534), whose lower layers turned out to contain portions of the *Basilica*, not yet known in the 19th century and now used for an edition for the first time. The *scriptio inferior*, dating to the 11th century, contains remains of two different manuscripts, one (Va) with fragments of books 2, 3, and 4, and the other (Vb) of books 11, 13, and 14.[9] The codex Vat. Reg. gr. Pii Secundi 15 (*Diktyon* 66374) has preserved palimpsested leaves from an 11th-century manuscript of the *Basilica* containing books 58–59 (ΠΣ), as already established by Mercati, who however did not live to edit them; we may note that it is *codex unicus* for books 58 and 59.[10] All these witnesses were exploited for the Groningen edition, where they have been described in the prefaces and may be traced through text and critical apparatus.

NEW PALIMPSESTS

If Scheltema had already made extensive use of palimpsests, after the completion of the Groningen edition two further *Basilica* palimpsests were discovered in Vienna in the project Rinascimento virtuale at the beginning of this century.[11] One is in Vind. hist. gr. 10 (*Diktyon* 70887), the other in Vind. suppl. gr. 200. Both have been published in a detailed study by Jana Grusková and myself, which appeared in 2010. Jana Grusková dealt with the palaeographical and codicological aspects, while I contributed a legal historical analysis.[12] These two manuscripts increase the importance of palimpsests for our knowledge of the transmission of the *Basilica* text in terms not only of number, but also of date: we now have ten non-palimpsested manuscripts of different size, dating from the eleventh to the 16th century, and six palimpsests, also of varying size, but generally of earlier date. The primary script of almost all the palimpsests dates to the 11th century, whereas of the 'normal' codices only one is as old. It would of course require a more thorough analysis to make a precise comparison, but the following table gives an indication of the relative importance of these palimpsests against the background of the scarcity of non-palimpsested manuscripts, and at the same time it emphasizes how thin the thread of the transmission of the text is: rarely is a book of the *Basilica* found in more than two direct witnesses, and not infrequently a palimpsest is a *codex unicus*.

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[6] Stolte, New Praefatio, section 3.1 (pp. 245–247).

[7] The *Basilica* were replaced by Harmenopoulos' *Hexabiblos*, followed by some other texts; see Burgmann *et al.*, *Repertorium*, no. 92.

[8] Ferrini and Mercati, *Basilicorum libri LX*. See Pasini, *I palinsesti greci*, 223–229, esp. 225, with pl. 2. Additional leaves from the original manuscript have also been identified in the lower layer of Mess. gr. 158 (*Diktyon* 40819): see Rodriquez, Un "nuovo" palinsesto, 73–95, and cf. Rodriquez, Riflessioni, 625–645, esp. 625–627.

[9] Stolte, New Praefatio, section 3.1 (p. 245).

[10] Mercati, Nuovi frammenti.

[11] For additional leaves of a known palimpsest see also above, n. 8.

[12] Stolte and Grusková, Zwei neue Basiliken-Handschriften.

Age (provisional)	Palimpsested *Basilica* text	Number (in bold) of additional non-palimpsested manuscripts of the same text
XI	Va	books 2–4: **1/2**
XI	Vb	books 11 and 13–14: **2**
XII ex./ XIII in.	Π	books 15–18,2,16: **1** book 18,2,26–18,8,5: **0**
XI	ΠΣ	books 58–59: **0** book 60: **1**
XI[1]	Vind. hist. gr. 10	titles 2,2 and 2,3: **2** florilegium from books 3, 5, 6, 7, 8, 9, 10, 16: **variable but ≤ 2** florilegium from book 19: **0**
X[2]/ca. 1000	Vind. suppl. gr. 200	books 21–26: **1** books 28–29: **2**
X/XI	A	Florilegium of nearly all *Basilica* books, among which also *libri deperditi*: **some 0**

Given the tenuous transmission of the text of the *Basilica*, the discovery of the two Vienna palimpsests represented a significant development. The manuscript Vind. hist. gr. 10 turned out to contain 23 leaves with palimpsested *Basilica* text, and the manuscript Vind. suppl. gr. 200 to contain 48.[13] The *scriptio inferior* with the *Basilica* fragments in Vind. hist. gr. 10 has been dated to around 1000 or a little later, i.e. the first half of the 11th century, and that of Vind. suppl. gr. 200 to the second half of the 10th century.[14] Perhaps more important than these differences is the fact that, on closer inspection, Vind. hist. gr. 10 contains primarily a selection of *Basilica* fragments, and these often in a summarized version; only of titles 2 and 3 of book 2 does it offer a full text insofar as preserved on these leaves.[15] While this anthology is obviously most welcome, it is less valuable for our knowledge of the *Basilica* text than, e.g., the *Florilegium Ambrosianum*: this Milanese witness is also an anthology, but offers the full text of the fragments it has selected.[16] As a direct witness of the text, the *scriptio inferior* of Vind. suppl. gr. 200 is invaluable. If its dating is correct, it may well be our oldest *Basilica* manuscript.

THE GENESIS OF THE *BASILICA*: *STATUS QUAESTIONIS*

So far, we have spoken of the *Basilica* as if they are a fixed and stable collection, compiled and transmitted as a unitary text, even if they suffered some loss and corruption in the process of transmission. But what do we mean when we speak about 'the *Basilica*'? Scholars disagree about the genesis of the text we call by that name, which is not the original name and only came into use later. From the 530s onwards, Justinianic legislation, issued mainly in Latin, was circulating in Byzantium in the form of various Greek translations, summaries, and commentaries. At the end of the 9th century, it was the aim of emperors Basil the Macedonian and Leo the Wise to create order out of the chaos by compiling one authoritative Greek version, in which the titles of *Digest* and *Code* on the same subject and the related *Novels* would be amalgamated and placed under appropriate headings. How exactly they proceeded, and to what extent their efforts differed, is a matter of intense scholarly debate, and is bound up with the question of the status and chronological order of the middle-Byzantine law books, such as the *Prochiron* and the *Eisagoge*. If one consults the various historical surveys of Byzantine legal sources,[17] one reads that there was an ἀνακάθαρσις τῶν παλαιῶν νόμων resulting in a volume with abolished laws (ἕν τεῦχος); that collections existed in more than one format—in sixty, forty, and then again sixty books—; that these were organised in four or in six τεύχη or volumes; that Basil's *Sixty Books* were not the same as Leo's; that the name *Basilica* was later adopted for Leo's collection in sixty books; that Leo is supposed to have ordered ἐξελληνισμοί of Latin technical terms and the deletion of superfluous elements

[13] For details, see the tables in Grusková, Paläographisch-kodikologische Analyse, 133–138.
[14] For the results of a new paleographical analysis, see Giuseppe De Gregorio and Jana Grusková in this volume.
[15] See Stolte, Rechtshistorische Analyse, 140–146.
[16] See also above, p. 342.
[17] The standard accounts are Pieler, Byzantinische Rechtsliteratur; Van der Wal and Lokin, *Delineatio*; Troianos, *Peges*, with translations into Italian (P. Buongiorno, Turin, 2015) and German (D. Simon and S. Neye, Berlin, 2017), in both cases with additional bibliography.

(e.g., the prooimia of the *Novels*). One reads much less, if anything at all, about different versions of the texts themselves, but by delving deeper one discovers such differences.

Taking all this into account, we must allow for the possibility that the text of the *Basilica* as represented in our edition is the outcome of a complex process, a text that may have looked different in the early stages, of which we would dearly love to have physical evidence in the form of manuscripts. The older a manuscript is, the closer it is to these early stages. For that reason, the palimpsests we have, and which, as we have seen, are generally older than the available non-palimpsested witnesses of the text, may turn out to be especially interesting for our knowledge of the early developments. Any differences give rise to the obvious question whether there is a link with different stages in the genesis of 'the' *Basilica* as has just been outlined. At this point we shall take a closer look at the lower layer of Vind. suppl. gr. 200.

VINDOBONENSIS SUPPL. GR. 200

The manuscript Vind. suppl. gr. 200 has been described in great detail in 2010 by Jana Grusková.[18] Recently, Giuseppe De Gregorio has further scrutinized the palaeography of the Vienna palimpsest. The *scriptio superior*, with a Lectionary of the Gospels, has been dated to the 12th century. Of interest here is the *scriptio inferior* of ff. 1–48, dated as 'second half of the 10th century'.[19] These 48 leaves preserve portions of books 21–26 and 28–29 of the *Basilica*.[20] Before the discovery of these leaves our information about these books of the *Basilica* was based primarily on the 13th-century Parisinus gr. 1348 (Pa) (*Diktyon* 50957), and in the case of (parts of) books 28–29 also on the 12th-century Florentine Laurentianus Plut. 80.11 (F) (*Diktyon* 16718), which unfortunately has lost several leaves; in addition there are the usual *testimonia*. Scheltema based his edition on these three sources. In 2010, having studied the leaves insofar as I had been able to read them, I noted that the version of the *Basilica* we find in the lower layer of leaves 1–48 is distinguished by three characteristics:[21]

1. Fragments that stem from Justinian's *Digest* do not contain the names of the jurists who originally wrote these fragments (*inscriptiones*).

2. It contains Latin *termini technici* where in other manuscripts these Latin elements are replaced by Greek translations (ἐξελληνισμοί).

3. When a passage stems from (the beginning of) a Justinianic *Novel*, it also contains the introductory prooimion, which is normally omitted in other *Basilica* manuscripts. I further noted a fuller version of constitutions drawing on CJ VIII,40 than one finds in the only other manuscript of the *Basilica* at this point, Paris. gr. 1348 (Pa).

In 2018, I was able to study the manuscript again, this time from improved images made, once more, by the Technische Universität Wien. As in all palimpsests, not everything can be read, but the lower layer has yielded a few more of its secrets. Although a full and systematic collation has yet to be made, the results of this renewed study enable me to improve on and to add greater precision to my observations in 2010. On the basis of these readings the following notes may be added to these earlier observations:

ad 1:[22] I have not found one single *inscriptio* in Vind. suppl. gr. 200. The contrast with Paris. gr. 1348, however, is not as marked as I suggested in 2010. It is true that Pa does have names of jurists by way of *inscriptio*, but not consistently: in the books represented also by the Vindobonensis they are found in Pa in books 21–23, but not in 24–26, with the exception of 25,1,4; and in varying frequency in books 28–29, which also holds good for the Laurentianus (F).

ad 2:[23] In 2010, I had noted a greater presence generally of Latin *termini technici* in our palimpsest[24] than in the Parisinus, where they had been replaced by so-called ἐξελληνισμοί, at the same time pointing out that technical terms had not escaped 'exhellenization' in all cases. This has been confirmed by renewed study. More

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[18] Grusková, Paläographisch-kodikologische Analyse, 123–132.

[19] See Giuseppe De Gregorio and Jana Grusková in this volume; Grusková, Paläographisch-kodikologische Analyse, 124.

[20] Detailed information about the content in Grusková, Paläographisch-kodikologische Analyse, tables III (pp. 135–137) and IV (p. 138).

[21] Details in Stolte, Rechtshistorische Analyse, 146–151.

[22] Stolte, Rechtshistorische Analyse, 146.

[23] Stolte, Rechtshistorische Analyse, 147–148.

[24] See also Grusková, Paläographisch-kodikologische Analyse, 130.

examples could be added, but more important is the fact that neither the Parisinus nor the Vindobonensis are consistent. True, the general picture remains the same: the Vindobonensis has considerably more Latin terms than the Parisinus, but over the eight books represented in the Vienna palimpsest the same legal concept is not either Latin or Greek. E.g., *mandaton* is found, but also ἐντολή, *procurator* but also φροντιστής, etc. These two Latin terms, often also written in Greek letters (μανδάτον, προκουράτωρ) are much more frequent in the Vindobonensis than in the Parisinus. The occurrence of the ἐξελληνισμοί demonstrates that the process of exhellenization has been more thorough in the tradition to which the Parisinus belongs than that of the Vindobonensis. Whether this is entirely due to the later date of the Parisinus is possible, but not certain.

ad 3:[25] In 2010, I noted a series of differences between the Parisinus—and thus the edition—and our Vindobonensis in the summaries of certain constitutions from the *Code*. Since all these constitutions turned out to belong to book 8 of the *Codex*, I had left open the possibility that these differences were connected with the version used for book 8 by the compilers of the *Basilica*. The established understanding is that for book 8 this was not the *index* of Thalelaios, but that of Anatolios,[26] and perhaps the version used for the Vindobonensis was yet another *index*. Insofar as I have been able to read the palimpsest, I have checked all places where a constitution from book 8 of the *Codex* is represented in Vind. suppl. gr. 200, but have not found further divergences from the text of Pa and the edition. The differences noted in 2010 are there, but not necessarily to be attributed to the fact that book 8 of the *Code* is a special case. Obviously, all other fragments representing the *Code* have to be checked as well.

As for the *Novels*, I had noted three cases in which a *Novel* had been incorporated in the *Basilica* text in Vind. suppl. gr. 200 in a longer version than the one we know from Pa and thus from the Groningen edition. In all three cases these *Novels* were represented with the full text of their prooimion, whereas these are the parts that normally are lacking in the *Basilica*. Since no other cases of *Basilica* text with the beginning of a *Novel* are found in the 48 palimpsested leaves of the Vindobonensis, I can only say that the three cases we have are consistently different in this respect.

As to particular readings of Vind. suppl. gr. 200, the following table sets out individual passages in the *Basilica* in which our palimpsest diverges from or confirms readings chosen by Scheltema *cum suis*. In addition to readings from Paris. gr. 1348, I have tried to include the evidence from *testimonia* where available. The table, in the order of the *Basilica*, does not contain cases already mentioned and discussed in some detail in 2010.[27] I reiterate that it is not based on a full collation.[28] I have concentrated on those passages where the critical apparatus of the Groningen edition pointed to divergent readings or textual problems.

	Basilica	**Vind**	**BT**	
1	21,2,10	38v	1035,8	§ 1 habent Vind Syn, om. Pa Tip
2	22,5,54	35r	1088,26–27	ἀπόντι θατέρῳ ... δικαζομένῳ Vind A, ἀπόντος θατέρου ... δικαζομένου Pa
3	23,3,15	45r	1121,7	προκατάρξεως Vind, κατάρξεως Pa | κακῇ Vind post corr.
4	23,3,17	45r	1121,20	οὐκ ἐκέρδανεν Vind Hb, ἐκέρδανεν Pa, ἂν ἐκέρδανεν scr.? Scheltema (app. ad loc.)
5	23,3,24	44v	1123,15ff.	τῷ τῶν πραγμάτων αὐτοῦ φροντίστη Pa, τῷ συνηγόρῳ αὐτοῦ Vind Peira | πραγματείας τρόπῳ Pa, om. Vind Peira | 19 τῷ ὁμολογήσαντι Vind Pa, τὸν ὁμολογήσαντος Peira | περὶ ἐπερωτήσεως Pa, τῆς μελλούσης ζημίας Vind Peira
6	23,3,25	44v	1124,4	κακῇ πίστει Vind Pa, καλῇ πίστει Peira
7	23,4,6	11r	1142,1–2	ἐν τοῖς Pa, ἐν τοῖς αὐτοῖς Vind NovT | ἢ καὶ Vind Pa, εἰ καὶ NovT (cf. app. NovT 694,14)

[25] Stolte, Rechtshistorische Analyse, 148–151.

[26] Van der Wal and Lokin, *Delineatio*, 82; Troianos, *Peges*, 258 (transl. Simon 206).

[27] References to the edition (fn. 1) are by page and line numbers, in order to provide access to the critical apparatus. Please note that line numbers will differ from those in the *Thesaurus Linguae Graecae*, where the lines are numbered for each fragment separately. Moreover, the length of lines in BT (Bibliotheca Teubneriana) and *TLG* is different, and these differences add up the longer a fragment is. The line numbering in Grusková, Paläographisch-kodikologische Analyse, and in her table III, follows the *TLG*, whereas Stolte, Rechtshistorische Analyse, refers to BT. Sigla as in BT (see also Stolte, New Praefatio, sections 3.1 [pp. 244–245] and 5.1 [pp. 253–254]), with the addition of Vind = Vind. suppl. gr. 200, and NovT = Justinian's *Novellae* ed. Schöll-Kroll.

[28] I gratefully acknowledge help from Jana Grusková in some places where I got stuck.

	Basilica	Vind	BT	
8	24,8,2	8v	1177,13	τὸν Vind Pa, τῶν A | λόγον Vind Pa, λόγοις A
9	24,8,7	8v	1178,4	ἡ φανερὰ ἀπαίτησις Pa, ὁ CERTOS Vind
10	24,9,1	8r	1179,5–7	οὐτιλίαν ἀγωγὴν τὴν τοῦ ἐναγομένου καὶ τοῦ ἐναγόντος σκοποῦσαν τὸ διαφέρον Pa, UTILIAN ἤγουν ARBITRARIAN σκοπούμενος τοῦ χρησίμου τοῦ ἐνάγοντος καὶ τοῦ ἐναγομένου Vind
11	24,9,10	33r	1180,24	ἀρβιτραρίας [crux] ἢ τὸ Pa (vide app. ad loc.), ARBITRARIAS ἢ τὸ Vind
12	24,10,10	14v	1182,3	noxalía : νοχαλία Pa, νοξαλία Vind
13	24,10,18	14v	1182,26–27	ordinem Digestorum tuentur Vind Tip contra Pa (cf. app. ad loc.)
14	25,1,13	31r	1190,22	πράγματι Pa, πράγματι καὶ τὴν IN FACTUM Vind
15	25,1,13	31r	1190,23	παραφυλακὴν Tip, περὶ φυλακὴν Pa, φυλακὴν Vind
16	25,1,32	25r	1194,2	περὶ ἐνεχύρων Pa, CONTRARIA Vind
17	25,1,35	25r	1194,14	εἰς τὸ διπλοῦν Pa, om. Vind A
18	25,1,42	32v	1195,24	καταβάλλω Vind, καταβ$^{\lambda\lambda\prime}$ Pa (vide app. ad loc.)
19	25,1,44	32r	1196,3	ἀγωγὴ Pa, ἀγωγὴ καὶ ἐκβάλλεται Vind A
20	25,1,45	32r	1196,6	ἀγωγῇ om. Vind
21	25,1,46	32r	1196,9–10	καὶ αὐτὸν ἐναχθῆναι Vind Pa (vide app. ad loc.)
22	25,1,47	32r	1196,13–14	ἐὰν δὲ πταίσματι ... καταδικάζεται Pa, om. Vind
23	25,1,49	32r	1196,18	τῆς habet Vind, om. Pa, suppl. Hb
24	25,2,6	26v	1199,22	ἀνδράποδα Vind Syn, om. Pa
25	25,2,5	26v	1200,5	ἐξωτικοῦ Vind Pa, -κῶν Peira
26	25,4,1	22v	1212,7	μὴ ἔχων Pa, ὡς μὴ ἔχων Vind
27	25,4,3	22v	1212,18	τις Pa, om. Vind
28	25,4,5	22v	1212,24	τοῦ δεσπότου Pa, om. Vind
29	25,4,17	19v	1214,6	ἐν προτιμήσει Vind Pa (cf. app. ad loc.)
30	26,1,8	16r	1242,22	ἐπιλέξεται ... ἐπερωτήσας Vind Tip, om. Pa (homoiot.)
31	26,1,14	30r	1243,19	ἢ Vind, om. Pa Peira
32	26,5,108	21v	1290,1–4	ἐντολὴν (confirmat Tip) ... 4 ἡ γὰρ ἐντολὴ Pa, μανδάτον ... τὸ γὰρ μανδάτον Vind
33	26,5,122	20v	1291,14	ἡ Pa, om. Vind
34	26,5,124	20v	1291,18–19	ἐν ἐπιλογῇ Pa, supra eadem verba scripsit ιν σολουτουμ Vind (cf. app. ad loc.)
35	26,5,126	20v	1291,23–26	φροντιστής ... -οῦ Pa, προκουράτωρ ... -ορος Vind
36	26,5,131	20v	1292,8	τὴν ἐντολὴν ἤτοι προτροπήν Pa, τὸ μανδάτον Vind, τὴν ἐντολὴν Tip
37	26,5,132	20v	1292,10	ἐν ἐπιλογῇ Vind Pa (vide app. ad loc.) | ἀντὶ ἀργυρίων Pa Tip, om. Vind Syn (vide app. ad loc.)
38	26,6,1	20r	1293,6–8	διαφέρει ... χρήματα Pa, om. Vind (vide app. ad loc.)
39	26,6,6	20r	1293,15	χρεῶν γένηται A, χρεῶν γίνεται Vind, χρεωστῆται Pa (vide app. ad loc.)
40	28,8,29	42r	1382,21	μετὰ χρόνον F, ὡρισμένως Vind Pa A (vide app. ad loc.)
41	28,8,39	47r	1385,7	περὶ προικὸς F Pa, ἀγωγῆς τῆς προικὸς Vind A
42	28,14,18	5v	1433,10	ἐξ ἀρχῆς F Pa : ἑξῆς Vind (cf. app. ad Nov 22,46 pr. [NovT 182,5])

Commentary on Selected Readings

1, **2** Preferred reading confirmed by Vind.

3 Conjectured readings προκατάρξεως and κακῇ confirmed by Vind.

5 Note the different exhellenisms: τῷ τῶν πραγμάτων αὐτοῦ φροντίστῃ Pa, τῷ συνηγόρῳ αὐτοῦ Vind Peira.

6, **8** Vind confirms readings of Pa.

9 A clear example of an older phase of the text which we read in Pa and therefore in the Groningen edition. The Latin *Digest* text (D. 13,3,1 pr.) states that 'Qui certam numeratam pecuniam petit, illa actione utitur 'si certum petetur'. The action becomes in the Vindobonensis ὁ CERTOS, for which the Parisinus has ἡ φανερὰ ἀπαίτησις.

10 The Latin *Digest* text to which this *Basilica* fragment goes back forms the beginning of the title D. 13,4 *De eo quod certo loco dari oportet*. It consists of two fragments, one taken from Gaius' commentary on the provincial edict and the other from Ulpian's commentary on the edict of the (Roman) praetor. (The latter passage continues for much longer than the beginning which is of interest here.) In the *Basilica* there is no clear distinction between the two fragments: the beginning of Ulpian's text has been amalgamated with Gaius' text into one fragment, as is also clear from the fact that there they form one sentence. The text as transmitted in the Parisinus and adopted in the Groningen edition makes sense, but diverges from the Vindobonensis. The version we read in the Vind reads ΄Ο ἔν τινι τόπῳ ἐπερωτήσας ἑαυτῷ τι δοθῆναι δύναται καὶ ἀλλαχοῦ κινεῖν UTILIAN ἤγουν ARBITRARIAN σκοπούμενος τοῦ χρησίμου τοῦ ἐνάγοντος καὶ τοῦ ἐναγομένου· διὸ καὶ αὔξει καὶ μειοῦται τὸ ποσόν. It diverges from Pa in reflecting the words *aribitraria actio* and *utilitatem* of the Latin text. The scribe of the Vindobonensis has written UTILIAN and ARBITRARIAN in Latin script; the adjective *arbitraria* occurs a few more times further down, also in Latin letters. (We may note in passing that Vind has Στίχος and Πάμφιλος instead of Πέτρος and Παῦλος [BT 1179,8]). The two summaries are sufficiently different to raise the question whether perhaps their ultimate 6th-century sources were different texts.

11 Vind confirms Pa.

13 Preferred reading confirmed by Vind.

14 Not unlike our no. **9**, the Vindobonensis preserves an older stage in the transmission of the summary of the original Latin text. The last part of D. 13,7,13 pr. reads 'sed et ipse debitor aut vindicare rem poterit aut in factum actione adversus emptorem agere'. The *Basilica* read at this point: καὶ κατὰ τοὺ ἀγοραστοῦ τὴν ἐπ᾽ αὐτῷ τῷ πράγματι in Pa, followed only in Vind by καὶ τὴν IN FACTUM.

17 The Latin text does not speak of liability *in duplum*, and only has *furti teneri*. Vind and A thus follow the *Digest*.

19, **22** Here Pa seems to have the better readings.

23 Conjectured reading τῆς confirmed by Vind.

24 Preferred reading confirmed by Vind.

27, 28 Here Pa seems to have the better readings.

29 Vind confirms the infelicitous exhellenism ἐν προτιμήσει of *in solutum* in Pa.

31 Conjectured reading confirmed by Vind.

32, **35** Vind transmits Latin technical terms where Pa has exhellenisms.

36 Vind transmits Latin technical terms where Pa has exhellenisms.

34, **37** The Groningen editors had noted at the words ἐν ἐπιλογῇ: 'in solutum' male exhellenisatum' with a reference to the same (mis)translation a few lines down in Bas. 26,5,132 (our no. **37**). This infelicitous exhellenism is found in both places in the Vindobonensis as well, but at Bas. 26,5,124 one reads with some difficulty ιν σολουτουμ, written over these words as an interlinear scholion. Our no. **29** is evidence of an equally unsatisfactory alternative exhellenism, ἐν προτιμήσει, and here, too, Vind goes with Pa.

37 The reading ἀντὶ ἀργυρίων of Pa is confirmed by Tip and supported by the Latin text of the *Code* (*pro pecunia*); the reading of A is in doubt (see the apparatus), and Vind does not have it.

38 In addition to the note in the critical apparatus this is evidence of a *Basilica* manuscript without these words.

39 Preferred reading confirmed by Vind.

40 The readings of the *Basilica* manuscripts are evidence of two different exhellenisms, μετὰ χρόνον (F) and ὡρισμένως (Vind Pa A). Whether these are meant to replace *ex intervallo* or *interposito tempore* remains an open question. Both are to be found in this *Digest* fragment, but, although the summary in the *Basilica* is an adequate rendering of the legal content, it phrases the rule differently. For renderings of *ex intervallo* see Bas. 11,2,7,5 = D. 2,14,7,5 with scholia: μετὰ χρόνον (BT 626,17), μεταχρόνως (BS 211,7), but also ἐξ ἰντερβάλ(λ)ο (BS 190,25; 197,21).

42 Bas. 28,4,18 draws on Nov. 22,46–47 pr. The manuscripts F and Pa read at BT 1433,10 ἐξ ἀρχῆς, which does not make sense. The textual tradition of the *Novels* has preserved this reading in the manuscript Laurentianus Plut. 80.4 (*Diktyon* 16711), but the manuscript Marcianus gr. Z. 179 (*Diktyon* 69650) has ἑξῆς, which is supported by the Authenticum's *deinceps*. Schöll and Kroll prefer ἑξῆς, and so does Zachariä von Lingenthal. The Vindobonensis proves that the *Basilica* are also divided on this point.

THE VALUE OF THE VINDOBONENSIS SUPPL. GR. 200 FOR THE EDITION OF THE *BASILICA*: A PROVISIONAL CONCLUSION

The combined results of 2010 and the present investigation leave no doubt about the value of our palimpsest for the constitution of the text of the *Basilica*. It is also beyond doubt that, if the editors had known it, they would have printed the reading of the Vindobonensis in a significant number of cases. The established understanding is that we are dealing with the development of a body of texts that starts with the Justinianic legislation, is transformed in the writings of the *antecessores*, and leads to the *Basilica*, losing its Latin characteristics in the process. True, we cannot in all cases observe every stage of that process and must sometimes conjecture on the basis of documented instances of other, similar cases, but that basis is solid and is now even reinforced by the evidence of the Vindobonensis. If, then, we have two manuscripts of the *Basilica*, our Vienna palimpsest and one other codex, and the Vindobonensis transmits a reading that clearly represents an earlier stage in that process than the other manuscript, we may at least infer that the Vindobonensis testifies to an older version, perhaps the original version, of the *Basilica*. Generally speaking, the editors have selected older versions where more than one was available to them. All this takes its departure from the hypothesis that there was one original version, of which the others are later developments, and presupposes that it is the aim of an edition to reconstruct this original version. The attraction of this hypothesis is enhanced by a long tradition in legal scholarship of using the *Basilica* predominantly for textual criticism of the Justinianic texts. For that purpose it is useful to reconstruct not so much the *Basilica* as the original 6th-century Greek texts which were adopted, and perhaps adapted, to compile the *Basilica*. The problem lies in the evidence of the manuscripts available to us. Sometimes a reading has been transmitted that clearly is a misinterpretation of the Latin version. However, we cannot always be sure that this misinterpretation was not already in the original version of the *Basilica*. The critical apparatus of Scheltema's edition contains many examples of conjectures about an older version of the—suspicious—reading they had printed. The only reason why the editors did not put the older and 'better' version in the text was that they lacked firm evidence of its being still present in the *Basilica*. Therefore they printed the 'misinterpreted' version in the text and wrote in the critical apparatus, e.g., *interpres antiquus scripserat* [reconstructed 6th-century reading] *quae male vertit exhellenista*. The surprise of the Vindobonensis was that it confirmed the presence of that conjectured version in the *Basilica*.[29] No doubt Scheltema would have adopted it and relegated the later 'misinterpretation' to the apparatus.

The bottom line seems to me that the Vindobonensis proves that a greater number of features of these 6th-century texts were still present in early *Basilica* manuscripts than we were allowed to think on the basis of the—few—codices known to us so far. In the case of the portion of the *Basilica* preserved in the Vindobonensis we mostly had only the Parisinus.

Bearing this in mind, we may now look at the overall picture presented by the 42 cases in the table in section 5. As a rule, the text of the edition is based on Pa and *testimonia*. If the Vindobonensis agrees with the Parisinus, there is no reason to change the text, and at best we may enrich the apparatus with that information. Where the Vindobonensis diverges from the Parisinus, sometimes it stands alone, and sometimes it is supported by one or more *testimonia*. Especially where these *testimonia* follow the Vindobonensis and the reading is more plausible, that reading is to be preferred over the Parisinus. It is my belief that in almost half of the 42 cases in the table discussed above, the editors would have selected the reading of the Vindobonensis, even against the evidence of the tradition of the text insofar as it was available to them at the time. That is not to say that the Vindobonensis always has the better text. In at least three cases the Parisinus is to be preferred: **22**, **27**, **28**, and probably also **19** and the second reading in **37**. But **1**, **2**, **3**, **5**, **7**, **9**, **10**, **13**, **14**, **16**, **23**, **24**, **30**, **31**, **32**, **35**, **39**, and **42** should be accepted or at least considered very carefully. Or not at all? For an answer to that question we must look again at the genesis of the *Basilica*.

[29] Examples in Stolte, Rechtshistorische Analyse, 147.

THE POSITION OF THE VINDOBONENSIS SUPPL. GR. 200 IN THE TEXTUAL TRADITION OF THE *BASILICA*

In 2014 Tom van Bochove plausibly argued[30] that certain features of the Vindobonensis speak for an older version of the text of the *Basilica*, which one also finds in other manuscripts, such as the manuscript Parisinus gr. 1357 (*Diktyon* 50967), the lost manuscript of the French humanist lawyer Jacques Cujas (also known as the *Codex Ridolfi* after its former owner), the *Florilegium Ambrosianum*, and the Paris manuscript Coislinianus 151 (*Diktyon* 49290). Van Bochove links these common characteristics with the genesis of the *Basilica*. On the basis of my analysis published in 2010, he considers the lower layer of Vind. suppl. gr. 200, together with the other witnesses just mentioned, to be a representative of Basil's *Sixty Books*, to be distinguished from Leo's *Sixty Books*, which were soon called τὰ βασιλικὰ νόμιμα or simply τὰ Βασιλικά. He could well be right, but it is not the only possible conclusion. What do the early manuscripts of the '*Basilica*' in fact tell us?

Annoyingly, if we survey all manuscripts of the *Basilica* that have survived to our time (and they are not many!), they do not neatly divide into an older group (consisting of the mss. just mentioned), and a younger one that shows characteristics which correspond to the changes ordered by Leo the Wise. Moreover, all the initiatives of Basil and Leo recorded in our sources must have taken place within the very short time-span of their reigns—that is, forty-five years at most, and probably much less, some twenty years. If the imperial commands had been followed religiously, after the early 10th century no manuscripts would have been written with 'old' characteristics, such as Latin *termini technici*, or with 'superfluous' elements.[31] In my view, the transmission of the text as we know it does not correspond to that pattern. Even if we look at the five manuscripts Van Bochove considers to be representatives of the *Sixty Books* of Basil the Macedonian, they are at least problematic as a group: the *Florilegium Ambrosianum* is precisely that, a florilegium; the *Codex Ridolfi* has not survived and is known only from what Cujas tells us about it; Paris. gr. 1357 is a late copy (by John Mauromates, 16th century); Coislin. 151 is itself much later than our palimpsest (14th century), but contains an *index titulorum* of all sixty books of the *Basilica* in a different hand that points to an older version; and our Vienna palimpsest, Codex suppl. gr. 200, definitely has old features, but not consistently. None of the five share exactly the same characteristics. An exact dating of Vind. suppl. gr. 200 would have been invaluable, but we have to be content with an approximate dating to half a century. While I leave the decision to palaeographers, I note that they do not opt for a dating before 912. In all this, we should remind ourselves that the *fata libellorum* may have cruelly distorted our image of the transmission of the text. Where does all this leave editors of the *Basilica*?

The commands of the legislator have been preserved in prefaces of shorter law books and in a preface to the *Basilica*. In the past couple of decades, a few scholars have displayed an enormous amount of ingenuity in their attempts to explain what exactly happened during the reigns of Basil and Leo. The main problem is that the actual manuscripts of what we collectively refer to as the *Basilica* seem to tell a slightly different story—or, if you like, to document only a limited success of all these commands. As is generally accepted, and also followed by Van Bochove, the most likely chronological sequence that led to the *Basilica* as they have been transmitted is as follows:

1. The (mainly) Latin codification of Justinian circulated in various Greek versions, summaries and commentaries. These versions stem from the first few generations of jurists, some of whom had actually helped to compile *Digest* and *Code*, or at least as *antecessores* had taught them to their mainly Greek-speaking students. They contain the Latin *termini* typical for the early Byzantine legal language.

2. Under Basil the Macedonian, the existing law was purified (ἀνακάθαρσις τῶν παλαιῶν νόμων) and a revised version prepared. The origin of the *Basilica* may have been—and this is a hypothesis of the late Scheltema—simply a list of books with titles, the latter drawing on the *rubricae* of *Digest* and *Code*. An example has been transmitted as the so-called *Index Coislinianus*, an index of all sixty books on ff. 1–18r of Coislin. 151. Such an index would then be expanded by adding references to books and titles of Justinian's *Digest* and *Code*, supplemented by *Novels* where such were relevant for the subject indicated by the title. The ensemble

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[30] Van Bochove, Preluding the *Basilica*, esp. 280–287. The part pertinent to the present subject is summarized at p. 317.

[31] Of the shorter law books, the most recent is probably the *Epitome legum*. In its preface Leo is described as 'having smoothed the roughness of the law together with the words occurring there into softness' (τήν τε τραχύτητα τοῦ νόμου σὺν ταῖς ἐκεῖσε λέξεσιν ἐγκειμέναις εἰς πρᾳότητα λειώσας, ll. 68–69 Schminck). Schminck, *Studien*, 121–128 argues for 912, against the traditional dating to 921. The λέξεις are no doubt the (Latin) *Fachausdrücke*, as Schminck translates.

would constitute a working-list of the material to be inserted under the various rubrics, and this filling out of the titles could be left to 'private initiative'. This would explain why we have manuscripts in which the same chapters sometimes have different versions.

3. A measure of uniformity was achieved by selecting versions of *Digest*, *Code*, and *Novels* that were preferred over others, or perhaps had emerged as the most frequently used. An example is the *Digest Summa* of the so-called Elder Anonymus, which we find not only in the *Basilica*, but also in canonical collections.

4. The Latin *termini technici* were replaced by Greek equivalents, the *exhellenismoi*. Sometimes they were clumsy translations of the Latin into Greek, apparently not made by lawyers.

5. By way of explanation, scholia were added, often by selecting other, more extensive versions of the same fragments that had also originated in the activity of the jurists of these first few generations ('old scholia').

6. Florilegia, following the *ordo librorum* (*Florilegium Ambrosianum* and the text of the *Ecloga Basilicorum*), or reordering the fragments (*Synopsis Basilicorum Maior*), came into being.

7. Later, probably in the 11th century, 'original' new comment was written on the *Basilica* ('new scholia').

Steps 2–4 were the result of initiatives and/or legislation by Basil and Leo. The reported sixty, forty and then again sixty books suggest some tinkering with the concept of a consolidated representation of the Justinianic legislation. Steps 5–7 are 'private' initiatives and bear witness to interest in and use of the *Basilica*. I propose to see this less as a well-organized, top-down introduction of new legislation, than as a modernisation of the use of existing legislation, a process during which some changes in the law were effected as well, some successful, others less so. The end of the process is the *Basilica cum scholiis*, a *thesaurus jurisprudentiae graeco-romanae*. The older manuscripts may represent individual steps towards that goal.

The extant manuscripts all testify to some stage in the genesis of what ultimately became 'the' *Basilica*. The palimpsest in Vind. suppl. gr. 200 is no exception. Whether its lower layer contains a part (e.g., the third τεῦχος of six, or the second of four) of 'the' *Basilica* is dependent on what we mean by 'the' *Basilica*. As I have said, the manuscripts differ, among other things, as to the *inscriptiones* of *Digest* fragments, the form of the fragments of *Code* and *Novels*, and the extent of exhellenization. Vind. suppl. gr. 200 lacks such inscriptions and is still fairly 'unexhellenized'. It is consistent in the former, but emphatically not in the latter. Whether 'the' *Basilica* contained the names of the jurists, we cannot be sure. We have manuscripts with and without those names, and this does not seem to depend on their age. The testimony of the late 6th-century *Collectio Tripartita* tells us that the *Digest Summa* of the Elder Anonymus in all probability did contain this information.[32] On exhellenization we have the information of the Eisagogè (τῶν δὲ ῥωμαϊκῶν λέξεων τὴν συνθήκην εἰς τὴν ἑλλάδα γλῶσσαν μετεποιήσαμεν [ll. 52–53 Schminck]). As I have stated more than once, my belief is that, once replaced, these Latin *termini technici* did not return. If a late manuscript still has them, they have escaped exhellenization. Then there is the form in which constitutions of the *Code* and *Novels* appear. Vind. suppl. gr. 200 sometimes has the former in a divergent form, the latter in a more extensive form than other manuscripts. But as far as I can see, these fragments from Justinian's legislation, the *digesta* and διατάξεις, may diverge in shape, but not as to their identity. The content of the *Basilica* seems to have been stable from the start (the *indices titulorum* with their content),[33] but the form of individual fragments less so. And *Basilica* in forty books are mentioned just once, but they have not left one single physical trace.

Van Bochove may be right in attributing the version preserved in Vind. suppl. gr. 200 to Basil's *Sixty Books*.[34] Personally, I consider the evidence of the transmission of the text as too chaotic to go further than admitting that possibility. A more important and challenging question seems to me, how to deal with that evidence.

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[32] Van der Wal and Stolte, *Collectio Tripartita*, 96–110, and Preface, xxx.

[33] See most recently Van Bochove, Preluding the *Basilica*, 268–269 with references to his previous papers on the subject.

[34] Van Bochove's earlier suggestion (*To Date and Not To Date*, 107–121) that we should interpret the *Florilegium Ambrosianum* as such a representative has been received with some scepticism (Troianos, *Peges*, 256 fn. 147 [German transl. p. 205 fn. 149]: 'bold, but rather doubtful').

VINDOBONENSIS SUPPL. GR. 200 AND EDITING THE *BASILICA*

So, what about editing the *Basilica*? As far as the scholia are concerned, Scheltema chose to edit each individual manuscript. In his view, each set of scholia represented an individual scholar's activity and choice; in Byzantium, no *recensio Bononiensis* or *Glossa ordinaria* created the unity of the western tradition of the *Corpus iuris civilis*. One may wonder whether, to some extent, the transmission of the *Basilica* text proves a similar lack of unity as the scholia do. For a long time, lack of witnesses and poor insight into the genesis of the *Basilica* have obfuscated the problematic textual tradition and perhaps left too much hope that the Lachmannian method, if we may still call a traditional editorial method by that name, would yield the original *Basilica* text. This problem has been exacerbated by the fact that large portions of the *Basilica* are transmitted in just one or two manuscripts—or not at all. In the meantime, further witnesses have come to light in the form of palimpsests, and Vind. suppl. gr. 200 is a prime example. It does two things splendidly: it shows a stage at which the text of the *Basilica* has many features stemming from its 6th-century origins, and by doing so it gives us what, ever since the humanists, has driven interest in the *Basilica cum scholiis*: information about the Justinianic age.

As I pointed out in conclusion in my recent stock-taking of the state of editorial work on the *Basilica*, and alluded to above, Van Bochove's view 'undermines the foundation of all editions since Fabrot and we would have to accept that a sizable portion of the witnesses of these editions cannot be taken to belong to the direct transmission of the *Basilica*. At the same time, I would venture to suggest that the differences regard the outward characteristics of the transmission, but not the substance of the text'.[35] That problem is not new and certainly not Van Bochove's fault. It is not a fault at all, but a challenge, bound up with the problem of how to reconcile the needs of a practical edition with the need to present the refractory evidence of the textual transmission. As we have seen, the genesis of the *Basilica* was a complex process which took place over a short period of time. If we reserve the name '*Basilica*' for Leo's compilation in sixty books, Vind. suppl. gr. 200 and some other manuscripts might have to remain outside the scope of the edition. If we wish to reconstruct the original version—if there ever was one—the reverse would hold good, and Paris. gr. 1348 would not count for much, if it were not relegated to the status of *testimonium*. Both would be impractical and even foolish. But it would be equally foolish not to make the reader aware of the lack of a tidy, 'Lachmannian', tradition of the text they are reading. At the end of the day, the *Basilica* in whatever form have preserved the gradual process of 'hellenizing' the Latin inheritance of Roman legislation. Individual manuscripts document the stages of that process. The lower layer of Vind. suppl. gr. 200 is especially valuable in that it clearly provides a snapshot of a point half-way on that journey: it preserves Latin where other manuscripts have already lost it, it has exhellenisms where one would perhaps not expect them, and sometimes the two seem to its scribe to have been interchangeable. Basil or Leo, *Sixty Books* or *Basilica*, the Vindobonensis, like every manuscript, is indispensable if we want to follow that journey.

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[35] Stolte, Thirty Years Later, 186.

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A Carbonized Septuagint Palimpsest of the *Libri sapientiales* in Biblical Majuscule, *Codex Taurinensis*, Biblioteca Nazionale Universitaria, C.V.25 (Rahlfs-Ms. 3010): Its Text and Context*

INTRODUCTION

The object of the present study is the Greek palimpsest *Codex Taurinensis*, Biblioteca Nazionale Universitaria, C.V.25 (Rahlfs-Ms. 3010; *Diktyon* 63893). A direct study of the fragments of the Bible that survive in this palimpsest is very problematic, as a result of its terrible fate. The palimpsest was already seriously damaged by chemical reagents used in the 19th century to decipher the lower script, when, on the night of 25th to 26th January 1904, the fire that devastated the Library and its treasures, and the water used to extinguish the flames,[1] reduced the codex to five agglutinated blocks drastically reduced in size; the structural changes were worsened by the substances used to slow down the putrefactive process, and the parchment became hard, vitreous, and extremely fragile.[2] The scanty remains were entrusted to Erminia Caudana, who begun a masterful work of restoration in 1939.[3]

There have only been a few previous studies. Giuseppe Luca Pasini (Padua 1687–1770 Turin), the learned biblical scholar who became the director of the Turin University Library in 1745, published a short description in 1749: he records that the codex is *rescriptus*, has 121 folios, a dated colophon (1428), and transmits Moschopoulos' *Schediasmata Grammatica*.[4] Two and a half centuries later, thanks to the ingeniousness of the scholar of Byzantine music Neil K. Moran,[5] its scribe was identified as Georgios Baiophoros (further below).

Due to the condition of the manuscript, this preliminary study is based exclusively on a print copy of 42 digitally-enhanced multispectral photographs.[6] These images are one of the most impressive results of the specialist field of photographic recovery of old scripts that are illegible on the original document, and were produced by Fotoscientifica of Parma.[7] On behalf of the Ministero per i Beni e le Attività culturali and the Biblioteca Nazionale Universitaria of Turin, Daniele Broia's team[8] photographed the palimpsest for both the

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* Although every part of this article has been discussed collectively, we would like to indicate that the Introduction and § 1–2 were written by Chiara Faraggiana di Sarzana; § 3–5 by Felix Albrecht; and the Conclusion by both of us. We are very grateful to Detlef Fraenkel (Göttingen), Maria Letizia Sebastiani (Turin and Rome), and Eva Schulz-Flügel (Augsburg) for taking the time to share their knowledge with us. We would also like to thank the Biblioteca Nazionale Universitaria of Turin for the opportunity to study the images of the manuscript, and the organizers of the conference 'New Light on Old Manuscripts', Vienna, 25–27 April 2018, for giving us the opportunity to present these preliminary results concerning the Turin Septuagint palimpsest. The reader may take into account that the content of our article reflects the state of research in 2018 and that the article has only been slightly updated in terms of bibliography.

1 The best overview of the damaged collections is Sebastiani, *Le raccolte*, 8–13.

2 In the inventory of the librarian Francesco Cosentini, the palimpsest is grouped between those 'ridotti in stato inservibili e racchiusi in casse': Sorbelli, *Inventari*, 6, 41.

3 Bersano Begey, Il laboratorio Restauri, 3–6; images 2–5 show samples of the codex restoration. I am indebted to Maria Letizia Sebastiani, who brought this paper to my attention. A short but excellent profile of Erminia Caudana, one of the most accomplished restorers of papyri and parchment leaves in the past century, is online: https://www.aib.it/aib/editoria/dbbi20/caudana.htm (accessed 28.11.2022).

4 *Codices manuscripti*, I 394 (Codex CCCX). Catastini, Pasini, 536–538. A useful assessment of the notable reference items in the Turin Library in the 1820s is offered by De Pasquale, L'apparato bibliografico, 83–136 (https://bibliothecae.unibo.it/article/view/5713/5433, accessed 28.11.2022). Eleuteri, Biblioteca, 28–39, is the indispensable concordance of the shelf marks of the Greek manuscripts of Turin.

5 Moran, Palim-Moschopulea, 85–86; this article is an addition to Moran, Greek Music Palimpsests, 50–72.

6 One of them concerns small fragments whose origin is impossible to establish.

7 This renowned Italian laboratory, which had been founded by Daniele Broia and Floriano Finzi in 1963, closed in 2012.

8 Gamillscheg, Nachruf, 143; Faraggiana, Daniele Broia, 319–323.

cross-disciplinary, multiannual Italian project launched by Maria Letizia Sebastiani in 2000 to commemorate the centenary of the catastrophic fire of 1904,[9] and for the project Rinascimento virtuale (11/2001–10/2004) of the Culture 2000 programme of the European Union.[10] One reproduction of Ms. C.V.25 (image nr. 13[11] before and after digital enhancement) was published without a description in 2002.[12] This made public for the first time a new Greek fragment of *Ecclesiastes*, written in biblical majuscule. Unfortunately, this was insufficient evidence to prove that what survived were remnants of a very old manuscript of the Old Testament, hitherto unknown.[13] A second photograph (Ms. C.V.25, image nr. 53 before and after digital enhancement) was displayed in Rome, in the exhibition 'L'Europa riscopre i suoi antichi libri nascosti' (Roma Biblioteca Nazionale Centrale Vittorio Emanuele II, 29 ottobre – 16 novembre 2004) that brought Rinascimento virtuale to a close; eight further images (nr. 14, nr. 15, nr. 32, nr. 34, nr. 36, nr. 52, nr. 54, nr. fragments, before and after digital enhancement) have been published online by the Istituto Centrale per il Catalogo Unico.[14]

1. THE UPPER SCRIPT

The Turin codex is one of 21 palimpsest manuscripts whose upper script is from the hand of Georgios Baiophoros, a well-known scribe and restorer of manuscripts of the 15th century,[15] whose activity in Constantinople, particularly in the library of the Prodromos Monastery of Petra, was identified by Ernst Gamillscheg in seminal articles.[16] The palimpsest *deperditus* in the fire of 1904, C.V.24 (Pasini Nr. 153) (*Diktyon* 63599) was probably written by the same scribe, and perhaps belonged to the same codicological unit *recentior* together with C.V.25 (Pasini Nr. 310);[17] unfortunately, we will never know which *textus antiquior* was copied in majuscule. Be that as it may, C.V.24 and C.V.25 are the only cases of Greek codices with *membranae rescriptae* in the Turin University Library.

All manuscripts copied by Baiophoros on palimpsested parchment transmit grammatical works of Manuel Moschopoulos (1265 ca.–1316),[18] and were copied around the second and third decades of the 15th century

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[9] Sebastiani, Il recupero, 142–158; Sebastiani, Libri, 363–374. Short report of the project by Aghemo, Il progetto, 5–7 (http://www.bnto.librari.beniculturali.it/index.php?it/199/incendio-del-1904, accessed 18.11.2022).

[10] Home page of the project: http://www.rinascimentovirtuale.eu/ (accessed 28.11.2022); Giaccaria, Nuove identificazioni, 433.

[11] Each number refers to one side of a folio of the *codex antiquior*; this numbering (here preceded by #), which has been given after restoration for practical reasons, is absolutely problematic.

[12] *Rinascimento virtuale*, 12.

[13] Paolo Eleuteri, who at the time was the director of the Ca' Foscari University of Venice team charged with studying the fragments, surprisingly stated: 'il frammento torinese contiene Gregorio di Nissa, quindi non credo interessi il Septuaginta-Unternehmen di Gottinga' (I cite from his email of August 27th, 2004, answering my email of August 22nd, 2004). Therefore, Rahlfs and Fraenkel, *Verzeichnis*, did not record the Turin palimpsest, nor was it known to Rahlfs, *Verzeichnis*, due to the fact that the Septuaginta-Unternehmen was founded in 1908, four years after the catastrophic fire of 1904.

[14] 'L'Europa riscopre i suoi antichi libri nascosti' (Roma Biblioteca Nazionale Centrale Vittorio Emanuele II, 29 ottobre – 16 novembre 2004): http://www.bml.firenze.sbn.it/rinascimentovirtuale/pannello15.shtm; http://palin.iccu.sbn.it, particularly http://palin.iccu.sbn.it/Album.aspx?Key=00002&codice=TO0265&lang=it-IT (accessed 28.11.2022).

[15] The same stock of old parchment leaves was at his disposal to produce *codices rescripti* and to restore damaged books: this is well documented by the case exemplarily studied in Bianconi and Orsini, Libri e *membra disiecta*, 20–25.

[16] Gamillscheg, Zur handschriftlichen Überlieferung; Gamillscheg, Zur Geschichte; Gamillscheg, Zur Rekonstruktion. Further bibliography (leaving aside publications concerning the binding of the Baiophoros manuscripts): RGK 1, Nr. 55; 2, Nr. 74; 3, Nr. 90; De Gregorio, Manoscritti greci patristici, 319–327; Cataldi Palau, Un nuovo codice; Cataldi Palau, Un nuovo manoscritto, 270–271 [repr. in Cataldi Palau, *Studies*, I 289–291], with a list of the 21 palimpsests with upper script by Baiophoros known so far (the Turin manuscript, which she however could not study, is included; in the list a further palimpsest, Philadelphia, Free Library, Lewis E 235b, was not copied by Baiophoros, but by a very similar hand: *ibid*., 270 fn. 23, and the opinion of Nadezhda Kavrus-Hoffmann published online: http://openn.library.upenn.edu/Data/0023/html/lewis_e_235b.html and https://libwww.freelibrary.org/digital/item/23932, accessed 28.11.2022); Cataldi Palau, Mazaris; Canart, Additions et corrections, 44; Grusková, Neue Ergebnisse; Grusková, *Untersuchungen*, 103–129 (exemplary description of the palimpsest Vind. phil. gr. 286); Turco, Il palinsesto; Bianconi and Orsini, Libri e *membra disiecta*, 20–22; Stefec, Handschriften, 179. See also the contribution of André Binggeli in this volume.

[17] If this were indeed the case, Gaetano de Sanctis (1870–1957) was partially right in noting that the identification of the five charred blocks with the palimpsest Pasini 153 cannot be excluded: De Sanctis, Frammenti pergamenacei, 585, 586; Bersano Begey, Il laboratorio Restauri, 4–5. Cf. also Della Corte, I codici cretesi, 42.

[18] This should be said with the utmost caution, because 'there has been a tendency among cataloguers, earlier and more recent, to attribute to Moschopoulos any collection of σχέδη': Keaney, Moschopulea, 304. On the fortune of the Περὶ σχεδῶν of the learned

(13 of them are dated to the years 1418–1433/34). The lower scripts of about half of them contain fragments of patristic works copied in the 10th to 12th centuries.[19] One notably transmits not only folios datable to the 12th century with fragments of patristic literature, but also a substantial portion from a codex, datable to the third quarter of the 9th century, of Neoplatonic commentaries on Aristotle's logical treatises, and two bifolia datable to the 13th century, with fragments of the same content.[20]

The reuse of parchment leaves in Constantinople, as elsewhere, by scribes of the late Palaiologan period, is well attested.[21] Nonetheless, the abundance of *membranae rescriptae* by Baiophoros remains significant: his exceptional production of palimpsests belongs to 'a time when the practice must have been regarded with askance' also in the capital; 'it was probably not without reasons that Vaiophoros did not sign his products'.[22] His activity as scribe is attested between 1402 and 1433/34. The paper manuscript London, British Library, Additional 11892–11893 (*Diktyon* 38886–38887), a two-volume luxury copy of the *Suda*, dated 15 June 1402, is the only product where Baiophoros names himself in the subscription. It was realized for a 'Sir Andrea', whom Annaclara Cataldi Palau, with convincing arguments, proposes to identify with Andreas Argyropoulos, a notable personality of the imperial court, οἰκεῖος of Manuel II and ἄρχων in Constantinople from 1400 until 1414. He paid, for the second volume alone, the high price of seven and a half νομίσματα.[23] At one point in his career, Baiophoros suddenly began to use palimpsests as his writing material. He had worked for at least five years (1402–1407) as a scribe of high-quality manuscripts for customers rich enough to buy expensive books, but in 1418 (or perhaps a few years earlier) he began to copy grammatical books on recycled parchment leaves.[24] It is noteworthy that during precisely the same period, he was involved—together with Stephanos of Medeia (Thrace), who in 1416 was σκευοφύλαξ of the Prodromos Monastery[25]—in writing the two manuscripts, Paris, Bibliothèque nationale de France, gr. 2991A (11th September 1419) (*Diktyon* 52634; Rahlfs-Ms. 606) and Berlin, Staatsbibliothek, Phillipps 1577 (*Diktyon* 9478) (probably copied at a slightly later date[26]), which transmit the *Mazaris*, a masterpiece of Byzantine satire. Among the characters of the work (composed in 1414, or at most a few years later) it is possible to identify Andreas Argyropoulos, the addressee of the British Library manuscript that Baiophoros signed with his name.[27] This satirical dialogue circulated only in Constantinople and in the Despotate of the Morea, and for very few years; a thorough investigation of text and context of *Mazaris*[28] could probably help to explain some aspects of Baiophoros' career.

Given the fact that all the Baiophoros copies of Moschopoulos are of similar dimensions (ca. 200 × ca. 145 mm, or a little less),[29] we can infer that the Turin palimpsest had probably the same size. The text is written in one column, normally with 26 lines, sometimes varying between 24 and 27.

The Pasini catalogue describes the content as follows: 'Schediasmata Grammatica complectitur Manuelis Moschopuli, in quibus accurata traditur analysis secundum Grammatices regulas variarum precum, et complurium locorum Sacrae Scripturae, nec non prophanorum Scriptorum'. In the surviving folios, we read in fact some passages attested in Moschopoulos' Περὶ σχεδῶν, a grammatical compilation of earlier works, whose *editio princeps* (1545) was published in Paris by Robert Estienne; more than two centuries later, it was fol-

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scholar and teacher Manuel Moschopoulos, disciple of Maximos Planoudes and nephew of the distinguished bibliophile bishop Nikephoros Moschopoulos, see now Nousia, The Transmission, 1–25.

19 A detailed list is offered by De Gregorio, Manoscritti greci patristici, 322 fn. 15. Further data about the content of the *codices antiquiores* can be found in Cataldi Palau, Un nuovo manoscritto, Appendice 2.

20 Cataldi Palau, Un nuovo codice, 249–274, with pl. 52–57.

21 A scribe and restorer of manuscripts of the 14th century is studied by Mondrain, La réutilisation, 119–129. See also the contribution by André Binggeli in this volume.

22 Moran, Palim-Moschopulea, 85.

23 Cataldi Palau, Mazaris, 393.

24 Cataldi Palau, Un nuovo manoscritto, 266 [repr. in Cataldi Palau, *Studies*, 284]. It is not necessary to assume that Baiophoros obtained second-hand parchment leaves exclusively in the library of the Prodromos Monastery, because other book repositories in Constantinople could have provided him with the material he needed.

25 De Gregorio, Manoscritti greci patristici, 324–325; Cataldi Palau, Un nuovo manoscritto, 264; Cataldi Palau, I colleghi, 193–202 [repr. in Cataldi Palau, *Studies*, 305–316]; Stefec, Handschriften, 196.

26 Gamillscheg, Zur handschriftlichen Überlieferung, note 52.

27 Cataldi Palau, Mazaris, 368–394, 397.

28 See bibliography in Cataldi Palau, Mazaris, 368 fn. 6.

29 Cataldi Palau, Un nuovo manoscritto, 266, 268.

lowed by the rare edition edited by Michael Papageorgiou o Siatisteus, and printed in 1773 in Vienna by the imperial printer and publisher Joseph Lorenz von Kurzböck (1736–1796).[30] The known copies of Moschopoulos created by Baiophoros are all written on palimpsest parchment, except for the paper manuscript Oxford, Bodleian Library, Laud. gr. 16 (*Diktyon* 48237).[31]

In addition to our palimpsest, the two oldest manuscripts whose folios were recycled by Baiophoros are: a codex of the Gospels written in *ogivalis inclinata* of the 9th century, and reused for producing the Moschopoulos' *Erotemata* Ambr. Q 6 sup. (*Diktyon* 43139), dated 1426;[32] and a valuable exemplar of the *collectio philosophica*, which is the principal *codex antiquior* in the undertext of the manuscript Paris, Bibliothèque nationale de France, gr. 2575 (*Diktyon* 52207), a copy of Moschopoulos' *Schedography* dated 28 May 1424.[33]

2. THE LOWER SCRIPT

The burnt folios whose images we were able to study are the remains of an old majuscule codex of the Bible, and derive apparently from the oldest parchment stock that was used by Baiophoros. They are written in one column of ca. 30 lines; each line has 22–28 letters. The ruling is clearly visible on images nr. 15 and nr. 45. It is of the highest interest that they were washed and scraped in Constantinople in the early 15th century. The material conditions of the manuscript, and the limitations of a study confined to reading digitally-enhanced photographs, mean that it would be foolhardy to take a gamble by describing the codicological and palaeographical features of the script. With the greatest caution, we can say that the codex may be the product of more than one hand, and that the majority of the images show a biblical majuscule datable no later than the 7th century;[34] spiritus and accents appear very sporadically.[35] The most interesting palaeographical feature is a *delta* with the shape of a Latin uncial *d*, a letter that is normally known from Greek manuscripts of the 10th and 11th centuries produced in the East or in South Italian regions;[36] it is incomplete but clearly attested by image nr. 18, lin. 11 (ΕΙΔ̲ΟΝ ΥΠΟ):

What appears to be a later hand (9th century?) is visible on images nr. 37 and nr. 45; here, spiritus and accents are more frequent, the strokes are thicker, and a tendency emerges sometimes towards forms of the 'ogivale diritta'. If this impression is confirmed by further photographic investigation, we have a case of restoration of lost folios of the original codex.

2.1 The Content of the Codex Antiquior

We were able to read 41 of the 42 printed photographs of the Fotoscientifica at our disposal. We have faithfully retained their captions; the image with caption 'particolari' does not allow the identification of the five reproduced fragments.

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[30] Παπάς, *Μιχαήλ Παπαγεωργίου* (free access online: http://www.siatistanews.gr/apo_siatista/Papageorgiou-Papas.pdf, accessed 28.11.2022), 105 and fn. 345, 106, 183; Zeman, *Der Drucker-Verleger*, 143–178.

[31] We would like to add that a paper, unrecorded manuscript with grammatical works of Moschopoulos was sold by Christie's (Lot 7, Sale 5888, Books) on 26th November 1997: see https://www.christies.com/lot/lot-moschopoulos-manuel-fl-ca1300-erotemata-grammatika-and-301183/?, accessed 28.11.2022. The identity of the owner is unknown, provenance and date are given approximately: 'Eastern Mediterranean, ca.1500'. We cannot exclude that this item is a new manuscript copied by Baiophoros.

[32] Turco, Il palinsesto, 251–261, and pl. 1; Bianconi and Orsini, Libri e *membra disiecta*, 22–25.

[33] See above fn. 20.

[34] Cf. image nr. 53 (for this number see fn. 11) with the famous *Psalms* fragment *Λ* (*Diktyon* 70836) Washington, Smithsonian Institution, Freer Gallery of Art, F 1906.273; a detailed description of the manuscript is given by Rahlfs and Fraenkel, *Verzeichnis*, 383–386.

[35] A parchment fragment of probable Egyptian origin, dated by the editor to the 5th century, and transmitting a few remnants of *Sirach* 40:25–41:10, has two circumflexes from the hand of the scribe himself: description by Donatella Limongi, in Pintaudi, *Papyri Graecae Schøynen*, Nr. 15, 49–54, precisely 49, and pl. X.

[36] Perria, Vat. Palat. gr. 376, 59–76 [repr. in Perria, *Tra Oriente e Occidente*, 47–64, at 47–48, and pl. 1, 2]. *Diktyon* 66108.

The text consists exclusively of fragments from the *libri sapientiales*, and this was probably the content of the entire codex. With the help of the invaluable text search tool of the *Thesaurus Linguae Graecae*, Irvine (Ca.), it has been possible to identify passages from Proverbs (ch. 6, 18, 19, 20, 22, 25, 28, 29), Ecclesiastes (ch. 2, 3), Job (ch. 14, 31, 39), Wisdom of Solomon (ch. 15, 16), and Sirach (ch. 2, 3, 16, 26, 38, 39, 43, 44). Later (in 2010), a fruitful collaboration with the Septuaginta-Unternehmen in Göttingen was then embarked upon. The preliminary results of this collaboration as regards the *codex antiquior* are the subject of what follows.

In the table below, each asterisk (*) indicates a folio of the *codex antiquior*; the image numbers on the left refer to the *recto* sides, the image numbers on the right refer to the *verso* sides. Of two folios we have only the image of *recto*, of five folios only the image of *verso*. Indications of content in square brackets are provided on a codicological basis only (the text is not readable on the image). The text identification of image nr. 3 refers only to the major fragment; the minor fragment is not identified. The two fragments reproduced in image nr. 10 are sections of two different folios: nr. 10<A> (on the left in the photograph) is the verso side of nr. 19<B>. Likewise, the two fragments reproduced in image nr. 19 are sections of two different folios: nr. 19<A> (on the left in the photograph), which is irreparably damaged by chemical reagents, is the recto side of nr. 10<B>.

Folio	***Recto***		***Verso***	
*	nr. 3[37]	Prov 22:9a.b–12a	nr. 4	[Prov 22:12b–?]
*		——	nr. 5	Prov 6:2b–8b
*		——	nr. 6	Prov 28:28–29:9 ca.
*	nr. 7	[Job?]	nr. 22	[Job?]
*	nr. 8	Job 10:17a–11:3b	nr. 21	Job 11:4a–17b ca.
*	nr. 9	Wis 16:22b–28 ca.	nr. 20	[Wis 16:29–17 ca.]
*	nr. 19<A>	Job 5:21a–25a (with additions?)	nr. 10<B>	Job 5:25b–6:2a
*	nr. 19<B>	Sir 23:3a–6a	nr. 10<A>	Sir 23:11
*[38]	nr. 11	Eccl 3:5b–10a; 3:19d–20a	nr. 18	Eccl 3:13c–18d; 3:12a–13b
*		——	nr. 12	Prov 19:10a–18b
*	nr. 16	Eccl 2:17d–24b (*expl*. ΠΙΕΤ]ΑΙ)	nr. 13	Eccl 2:24b–3:3
*	nr. 15	Job 39:6a–14a	nr. 14	Job 39:15a–23
*	nr. 30	Prov 20:6a–11 ca.	nr. 23	Prov 20:11a–28b
*	nr. 24	Sir 16:5–13b ca.	nr. 29	Sir 16:14b–17:1 ca.[39]
*	nr. 28	Wis 17:6c–15 ca.	nr. 25	Wis 17:16–19 ca.
*	nr. 26	Prov 18:8–17 ca.	nr. 27	Prov 18:18–19:4 ca.
*	nr. 32	Job 14:19b–15:5b	nr. 35	[Job 15:6–23 ca.]
*	nr. 34	[Sir 2:10–16 ca.]	nr. 33	Sir 2:17a–3:8a[40]
*	nr. 36	Job 14:1–10b ca.	nr. 31	[Job 14:11–19a]
*		——	nr. 37	Sir 26:14a–27.1b
*	nr. 38	Wis 15:15a–16:1b		——
*	nr. 39	Sir 43:28b–44:4c	nr. 40	Sir 44:5a–16b
*	nr. 45	Job 31:16a–22b		——
*		——	nr. 52	Prov 25:18b–26b
*	nr. 54	Sir 38:25d–29c	nr. 53	Sir 38:30b–39:3b

[37] The identification refers only to the major fragment; the minor fragment is not identified.

[38] In image numbers 11 and 18, two fragments are reproduced; the smaller fragment must be turned, of course, because its text, as it appears in the photograph, pertains to the opposite side of the folio.

[39] It is possible that Sir 16:14a has been left out, because the sheet at the top is improbably cut off; 16:15 and 16 are omitted, 16:17a–c follow, and immediately after this there is an addition.

[40] The space is not sufficient for Sir 3:1a–4 (Sir 3:4 omitted?).

3. SELECTED VARIANT READINGS

In what follows, we propose to discuss, book by book, the readings that are typical for Ms. Ra 3010,[41] in contrast to the rest of the textual tradition. For Job, the Wisdom of Solomon (*Sapientia Salomonis*), and Sirach, Joseph Ziegler's editions have been used; for Ecclesiastes, Peter Gentry's edition; and for Proverbs, we have consulted the collations of the Akademie der Wissenschaften zu Göttingen.

3.1 Proverbs (ed. Rahlfs)[42]

For Proverbs, three variants can be observed. Their common feature is that they all differ from the text of *Codex Vaticanus* B (*Diktyon* 67840). Moreover, the readings of Ms. Ra 3010 in these three cases are always accompanied by a small group of three minuscules, namely Ra 68, 161-248.

Ms. Ra 68 is the famous *Codex Venetus*, Biblioteca Nazionale Marciana, gr. 5 (*Diktyon* 69476), a full Bible of the 15th century, which, in the case of the Wisdom books, must have been closely related to a Venetian manuscript which has now disappeared and which, along with *Codex Vaticanus* B, is one of the Aldina's *Vorlagen*.[43]

Ms. Ra 248 is Codex Vaticanus gr. 346 (*Diktyon* 66977) from the 13th century, containing the wisdom books as well as Ezra, Esther, Tobit, and Judith.[44] This manuscript has attained some fame because it is one of the manuscripts that underlies the Complutensian Polyglot. It is characterized by numerous Hexaplaric marginal notes.[45] The text it offers is assigned by Ziegler for Sirach and Wisdom of Solomon to the Lucianic Recension.[46]

Ms. Ra 161 is a witness of the wisdom books containing only Proverbs, Ecclesiastes, Song of Songs, and Job.[47] It dates from the 14th century, and is now in the Russian State Archives in Moscow (*Diktyon* 44388). It used to belong under the signature A 170 to the Royal Library in Dresden (*Diktyon* 13484). The history of the manuscript is exciting, but to go into that would go beyond the scope of the present paper.[48] It originally came from the Iviron Monastery (Athos). The book of Job contains a marginal commentary and is considered a sister manuscript of the aforementioned Ms. Ra 248.[49] Ra 161 is well known for its numerous Hexaplaric marginal notes to Proverbs, Ecclesiastes, and the Song of Songs. The following three variants occur:

Prov 18:22b

κυρίου 3010 A etc. (*inter alia* 68 161-248 788)] θεοῦ B-S* C V-Syh 259 542 336 411 728 Rahlfs.

In Prov 18:22b, Ra 3010 reads in unison with, *inter alia*, the three mentioned minuscules, κυρίου instead of θεοῦ.

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[41] The Akademie der Wissenschaften zu Göttingen has given *Codex Taurinensis*, Biblioteca Nazionale Universitaria, C.V.25, the official Rahlfs number 3010.

[42] A textual history of the Greek Proverbs is still a *desideratum*. The article by Forti, *Proverbs*, is insufficient from a historical point of view, because it disregards the history of transmission of the text of the Greek Proverbs.

[43] The text of Ra 68 should be compared with the book of Job in the Aldina edition; cf. Ziegler, *Iob*, 55. In case of Sirach, Ra 68 agrees many times with the Aldina; however, Ra 744 has far more in common with the Aldina; cf. Ziegler, *Sapientia Iesu*, 41. In the case of the Wisdom of Solomon, Ra 68 is a copy of *Codex Vaticanus* B; cf. Ziegler, *Sapientia Salomonis*, 39.

[44] Cf. Rahlfs, *Verzeichnis*, 250.

[45] Cf. for the Hexaplaric character of Ra 248, see Ziegler, *Iob*, 153. The text offered by Ra 248, however, belongs in the book of Job neither to the Origenic nor to the Lucianic recension; Ziegler assigns Ra 248 to a separate group of minuscules to which he refers with the siglum 'b'. The book of Job shows how close Ra 248 is to Ra 68; this close connection between the two manuscripts is also encountered in the three variants to Proverbs, provided in Ra 3010.

[46] In case of Sirach, Ra 248 is 'the most important minuscule' (Ziegler, *Sapientia Iesu*, 53: 'die wichtigste Minuskel'); it is the main witness to the Lucianic recension, cf. Ziegler, *Sapientia Iesu*, 65. In the case of the Wisdom of Solomon, Ra 248 belongs, with Ra 637, to the main group of the Lucianic recension, which has scarcely any characteristic features in the Wisdom of Solomon; cf. Ziegler, *Sapientia Salomonis*, 56–59.

[47] Cf. Rahlfs, *Verzeichnis*, 50.

[48] Cf. Gentry and Albrecht, The Amazing History, on the problem of the Dresden collection, with further bibliographical information.

[49] Cf. Ziegler, *Iob*, 153.

Prov 20:13b

διάνοιξον δέ 3010 A S V-Syh etc. (*inter alia* 68 161-248 788)] διάνοιξον B 360 Rahlfs.

In Prov 20:13b, Ra 3010 has an additional δέ.

Prov 22:11b

δεκτοὶ δὲ αὐτῷ πάντες ἄμωμοι ἐν ταῖς ὁδοῖς αὐτῶν 3010 68 161-248, ex Prov 11:20b] δεκτοὶ δὲ αὐτῷ πάντες ἄμωμοι rel. (A B-S V-Syh)[50] = Rahlfs.

In the case of Prov 22:11b, after δεκτοὶ δὲ αὐτῷ πάντες ἄμωμοι, an addition is found in Ra 3010 and exclusively in the three minuscules Ra 68, 161-248, which reads ἐν ταῖς ὁδοῖς αὐτῶν.[51] This addition is a textual component in Prov 11:20b. There it reads: προσδεκτοὶ δὲ αὐτῷ πάντες ἄμωμοι ἐν ταῖς ὁδοῖς αὐτῶν ('but acceptable to him [*sc.* the Lord] are all who are blameless in their ways', NETS).

3.2 Ecclesiastes (ed. Gentry)

For Ecclesiastes (*Qohelet*), a number of variants are attested in Ra 3010. For evaluation of the evidence, we refer to Peter Gentry's edition (Gentry, *Ecclesiastes*, 2019). In individual cases, the manuscripts were also consulted. In the following, we would like to give some examples, which may illustrate the special (also orthographic) characteristics of our witness:

Eccl 3:2b, 3:12b, 3:15b

Itacistic errors occur quite often, e.g.:

Eccl 3:2b πεφητευμένον pro πεφυτευμένον 3010. Itacism υ → η.[52]
Eccl 3:12b εἰ μί pro εἰ μή 3010. Itacism η → ι.
Eccl 3:15b ἴδη pro ἤδη 3010. Itacism η → ι.

Eccl 3:1, 3:13

Haplographies are present in two cases:

Eccl 3:1 καιρός 3010 C 534 Dam] καὶ καιρός rel. (Rahlfs Gentry).
Haplographically-induced lack of καί.
Eccl 3:13 om. ὁ post πᾶς 3010.
Most likely haplographic lack of *omikron* after *sigma lunatum*.

Apart from the orthographic and orthographically-caused variants, our witness offers a number of interesting readings that hint at its text-type. In the following, we wish to shed light on three verses, Eccl 2:26b, 3:5b and 3:14c-d:

Eccl 2:26b Gentry (2:26c Rahlfs)

σοφίαν καὶ γνῶσιν καὶ ἐπιστήμην 3010] σοφίαν καὶ γνῶσιν καὶ εὐφροσύνην A-C *O* B-S *L C* Rahlfs Gentry.

Eccl 2:26b reads in the Septuagint: 'For to the one who is good before him he [i.e. God] gave wisdom and knowledge and enjoyment' (NETS). The MT does indeed read 'and enjoyment' (וְשִׂמְחָה). Our witness, however, reads ἐπιστήμη (understanding) instead of εὐφροσύνη (enjoyment). The precise wording σοφίαν καὶ

[50] Not all other manuscripts attest δεκτοὶ δὲ αὐτῷ πάντες ἄμωμοι. A group of manuscripts reads προσδεκτοί instead of δεκτοί. Ra 788 belongs to this group, and in the cases mentioned above (Prov 18:22b and Prov 20:13b), it joins the Mss. Ra 68, 161-248. Ra 788 is to be mentioned here, as this manuscript, discovered by Reinhart Ceulemans, is a very important witness to the Hexaplaric tradition. Ceulemans is preparing an edition of the Hexaplaric marginal notes of this manuscript.

[51] Mss. Ra 549 and Ra 543 provide the addition ἐν ὁδῷ; Ms. Ra 613 provides the addition ἐν ὁδῷ αὐτῶν.

[52] Cf. Gignac, *Grammar*, 262–263.

γνῶσιν καὶ ἐπιστήμην offered by Ra 3010 is attested only in this manuscript. A look at the rest of the tradition, however, reveals that the reading ἐπιστήμη for εὐφροσύνη derives from the Hexaplaric tradition: a total of six manuscripts testify in one way or another to the reading ἐπιστήμη:

Three manuscripts transmit ἐπιστήμη as a marginal note *ad locum* (Ra 161-248, 252).[53] Three others incorporate the *varia lectio* ἐπιστήμη in different ways in the text (Ra 539, 299, 733): manuscript Ra 539 juxtaposes the two readings, separated only by a colon, and reads εὐφροσύνην: ἐπιστήμην; manuscripts Ra 299 and 733 connect both readings with καί and read ἐπιστήμην καὶ εὐφροσύνην.[54]

The nature of the tradition shows that the word-variant ἐπιστήμη originates from the Hexaplaric tradition: two of the manuscripts mentioned previously, namely Ra 161-248, have already been encountered in the context of Proverbs. These two witnesses are known for their Hexaplaric marginal notes. A close examination shows that the word-variant ἐπιστήμη has its origin in the Jewish recension of Symmachus. This is the conclusion of Peter Gentry, the editor of Ecclesiastes for the Göttingen Septuagint.[55] Symmachus in turn served Lucian of Antioch as one of his main sources in the creation of his (the Lucianic) recension.[56]

Eccl 3:5b

περιλήματος pro περιλήμματος 3010 798; περιλήμματος A-C(-λέμματος)[57] *L C*] περιλήμψεως *O* B-S Rahlfs Gentry.

In case of Eccl 3:5b, the main text, supported by Origen's recension, *Codex Vaticanus* B and *Codex Sinaiticus* (*Diktyon* 57946) reads περιλήμψεως, while the Lucianic recension and the *Catenae* in conjunction with *Codex Alexandrinus* (*Diktyon* 74390–74392; 39763) and *Codex Ephraemi Syri rescriptus* (*Diktyon* 49569) attest the variant περιλήμματος. Ms. Ra 3010 follows the Lucianic reading. Here, our witness differs slightly orthographically, insofar as it does not observe the double consonants and writes περιλήμματος with only one *mu*. The present variation is rather interesting, because two word-variants face each other, which both derive from the same verb περιλαμβάνειν: on the one hand ἡ περίλημψις ('the embracing'), on the other hand τὸ περίλημμα ('the embraced'). This word variance is typical of the Lucianic recension, so that the Lucianic provenance of our reading may be considered certain, in particular due to the divergence of the Lucianic and Origenic recensions.

Eccl 3:14c–d

Eccl 3:14c ἐπ᾽ αὐτῶν 3010 A-C S *L C* etc.] ἐπ᾽ αὐτῷ B-68′ 357 Rahlfs Gentry = MT = α′ θ′; ἐπ᾽ αὐτοῖς *O cII* etc.

The half-verse Eccl 3:14c reads, according to Rahlfs and Gentry, who both follow *Codex Vaticanus* B, which conforms to MT: ἐπ᾽ αὐτῷ οὐκ ἔστιν προσθεῖναι ('to it there is nothing to add', NETS). The question is how προστιθέναι is constructed: our Ms. Ra 3010 constructs with ἐπί + genitive and thus follows the majority text, which is, *inter alia*, attested by the Lucianic recension. In contrast, Rahlfs and Gentry prefer, with *Codex Vaticanus* B, the construction with ἐπί + dative. The latter indeed corresponds to the Koine use.[58] Apart from one exception (Esth 9:27),[59] the construction of προστιθέναι with ἐπί + genitive is not proven in the Septuagint

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[53] Ra 161-248 read σοφίαν καὶ γνῶσιν καὶ εὐφροσύνην and transmit to εὐφροσύνην the marginal reading ἐπιστήμη (in the nominative). Ra 252 attests for the whole verse (σοφίαν καὶ γνῶσιν καὶ εὐφροσύνην) the marginal reading ἐπιστήμην.

[54] Ra 299 reads σοφίαν καὶ γνῶσιν καὶ ἐπιστήμην καὶ εὐφροσύνην. Ra 733 reads γνῶσιν καὶ σοφίαν καὶ ἐπιστήμην καὶ εὐφροσύνην.

[55] The reading ἐπιστήμη is, according to Gentry, ascribed to Symmachus; Hatch and Redpath, *Concordance*, 530 s.v. ἐπιστήμη refer only to the fact that Symmachus uses ἐπιστήμη in Job 12:20; 21:22, namely, in cases where the Septuagint of Job reads σύνεσις.

[56] Cf. Albrecht, Die alexandrinische Bibelübersetzung, 241–243 (§ 4.2.1. 'Charakteristika der lukianischen Rezension'); Albrecht, Hebraica veritas, 113–132, esp. 126–127.

[57] For the reading of *Codex Ephraemi Syri rescriptus*, cf. Albrecht, Codex Ephraemi, 277.

[58] Cf. Blaß and Debrunner, *Grammatik*, 164–165, § 202.1 with n. 7, for the construction of προστιθέναι with ἐπί + Dat. Blaß and Debrunner, *Grammatik*, *l.c.*, as well as Helbing, *Die Kasussyntax*, 289, underlines that *Verba composita* with πρός are often constructed with the dative, but in many cases the preposition (πρός + acc.) is repeated. For the verb προστιθέναι, Helbing, *Die Kasussyntax*, 300–302, gives examples of both types of construction, and additionally indicates that προστιθέναι is often constructed with ἐπί + acc.

[59] Esth 9:27 (ed. Hanhart) reads: […] καὶ προσεδέχοντο οἱ Ιουδαῖοι ἐφ᾽ ἑαυτοῖς καὶ ἐπὶ τῷ σπέρματι αὐτῶν καὶ ἐπὶ τοῖς προστεθειμένοις ἐπ᾽ αὐτῶν […] ('[…] and the Judeans accepted them for themselves and their descendants and all who had joined them […]',

(except in later variants, as in our case). The reading of our witness may therefore be understood as a correction; and it is very likely that it has its origin in the Lucianic recension.

Eccl 3:14d καὶ ἐπ᾽ αὐτούς 3010] καὶ ἀπ᾽ αὐτοῦ B Rahlfs Gentry = MT; καὶ ἀπ᾽ αὐτῶν rel.

The half-verse Eccl 3:14d reads, according to Rahlfs and Gentry: καὶ ἀπ᾽ αὐτοῦ οὐκ ἔστιν ἀφελεῖν (‘and from it there is nothing to take away’, NETS). Ra 3010 is singular in its reading and clearly mistaken: ἀφαιρεῖν cannot possibly be constructed with ἐπί.[60] The genesis of the variant ἐπ᾽ for ἀπ᾽ is easily explained by the preceding ἐπ᾽ in direct context (ἐπ᾽ αὐτῶν Eccl 3:14c, *v. supra*); or, perhaps the mistaken spelling ε for α produced ἐπ᾽ αὐτοῦ.[61] The alteration of αὐτοῦ to αὐτούς might then have been dittographically favoured by the following οὐκ (*sigma lunatum*/ *omikron*). However, the overall evidence (Vv. 14c–14d) suggests that the *Vorlage* of our witness agreed with the majority text and offered the plural ἀπ᾽ αὐτῶν.

3.3 Job (ed. Ziegler)

Let us now come to Job. For Job, a number of variants are attested. All the variants have in common that they go against *Codex Vaticanus* B. As a rule, our text witness agrees with the *Codex Alexandrinus*, which is the main witness of the Lucianic recension in the book of Job.

Job 5:26a

ἀπελεύσῃ 3010 *L* (*inter alia* A) Syh^{mg} etc.] ἐλεύσῃ B S 913 *O* etc.[62] Ziegler.

The first variant occurs in Job 5:26a. Here, Ra 3010 attests the reading ἀπελεύσῃ, while the main text reads ἐλεύσῃ. The reading provided by our witness is clearly Lucianic. It is testified by the Lucianic recension. Moreover, Job 5:26a belongs to a group of five passages in which the Syrohexapla makes clear that this reading comes from a ‘different edition’. Ziegler discusses these five passages in detail in his introduction and demonstrates that the Syrohexapla marked the Lucianic recension as ‘another edition’.[63]

Further variants for Job are clearly attributable to the Lucianic recension, insofar as our witness shares them—as in the previously discussed case—with the Lucianic main group, that is to say, especially with the *Codex Alexandrinus*:

Job 5:27c, 11:8b, 14:22b, 31:21a, 39:11b

Job 5:27c ἐποίησας 3010 *L*$^{-637}$ (*inter alia* A)] ἔπραξας B S C 913 *O* etc. Ziegler.
Job 11:8b ἢ βαθύτερα 3010 *L*-406-644^{c} (*inter alia* A)] βαθύτερα δέ B S C *O* etc. Ziegler.
Job 14:22b ἐπ᾽ αὐτῷ ἐπένθησεν 3010 *L* (*inter alia* A) etc.] ἐπένθησεν B S C *O* etc.[64] Ziegler.
Job 31:21a εἰ δὲ καί 3010 *L* (*inter alia* A) etc.] εἰ B S C *O* etc.[65] Ziegler.
Job 39:11b καὶ ἐπαφήσεις 3010 *L* (*inter alia* A) Arm] ἐπαφήσεις δέ B S *O* etc. Ziegler.

In addition to the above-mentioned, clearly Lucianic variant εἰ δὲ καί instead of εἰ, another such variant is attested in Job 31:21a, which deserves to be mentioned separately: the reading χεῖρά μου instead of χεῖρα, which corresponds to the MT:

χεῖρά μου 3010 *O* 575-*lII*-Iul etc.] χεῖράς μου V; χεῖρα B S C *L* (*inter alia* A) Ziegler = MT.

The reading χεῖρά μου, which our Ms. Ra 3010 offers, is attested by the second Lucianic sub-group *lII*, by the commentary on Job by Julian the Arian, and by Origen’s recension. Moreover, the Syrohexapla declares

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NETS). The choice of the construction ἐπί + genitive may be due to the preceding construction: after προσδέχεσθαι with ἐπί + dative (*bis*) follows another, prepositional construction dependent thereon with ἐπί + dative, namely, προστιθέναι as dative participle, on which in turn ἐπί + genitive depends.

60 Cf. Helbing, *Die Kasussyntax*, 43–44, s.v. ἀφαιρεῖσθαι, for the common construction of the verb with ἀπό.

61 Cf. Gignac, *Grammar*, 278–282.

62 Divergent Ra 253: ἐλεύσουσι.

63 Cf. Ziegler, *Iob*, 112–113.

64 Additionally, some *variae lectiones minores* are attested; cf. Ziegler’s edition *ad locum*.

65 Divergent Ra 644^{c}: εἰ δέ.

this reading to be consistent with the Hebrew and notes that it is attested by the three Jewish revisers, i.e. Aquila, Symmachus, and Theodotion. Considering, furthermore, that the second Lucianic sub-group is characterized by influence from the Jewish recension of Symmachus (mediated by the Hexapla of Origen), it is clear that this reading is based on the Hexaplaric tradition.[66] A certain influence on our manuscript by Symmachus had already been noticed in the case of Ecclesiastes, namely, in the variant to Eccl 2:26b Gentry (2:26c Rahlfs).

In this case, the Lucianic main group (*L* = A-V-575-637-Iul-Chr) is divided: one part (A-637-Chr) goes with the majority text, while the other part (V-575-Iul and 3010) differs. The second part includes, *inter alia*, the commentary on Job by Julian the Arian, who is considered to be 'an important witness of the main Lucianic group' (Ziegler),[67] and *Codex Venetus* 'V', which is the second main witness of the Lucianic recension in the book of Job, and which also attests the pronoun μου.

The fact that the *Codex Alexandrinus* in the present case agrees with the majority text is not surprising: the *Codex Alexandrinus* occasionally shows, as Ziegler has observed, certain deviations from the Lucianic recension.[68] The cases in which the *Codex Alexandrinus* deviates from the Job commentary by Julian the Arian are specifically discussed by Ziegler: Ziegler deals with two special cases, namely Job 33:2 and 35:11, where a part of the main Lucianic group, namely V 575 Iul Chr, attests Hexaplaric additions, which are missing in the *Codex Alexandrinus* and in all other manuscripts.[69] The same applies to our passage, i.e. Job. 31:21a. Here, our Ms. Ra 3010 joins the Lucianic witnesses which attest the Hexaplaric addition. As a result, there can be no doubt that the reading χεῖρά μου offered by Ra 3010 can be designated as Lucianic, even though it is not attested by the *Codex Alexandrinus*.

The Lucianic character of our witness is confirmed by further variants. In two verses (Job 11:3b and Job 15:2), Ra 3010 attests to special readings, which, however, are very similar to the readings of the Lucianic main group:

Job 11:3b

(1) καὶ οὐκ 3010] ἢ οὐκ *L*$^{-A}$-644^{c} Syh^{mg}; οὐ γάρ A B S C *O* etc. Ziegler.
(2) ἀνταποκρινόμενος 3010 *L* Syh^{mg} etc.] ἀντικρινόμενος A B S C *O* etc.[70] Ziegler.

There are two variants in Job 11:3b. (1) The main text reads οὐ γάρ, while our manuscript attests the special reading καὶ οὐκ, which in turn most closely resembles the reading ἢ οὐκ of the Lucianic recension. (2) In the case of the second variant, ἀνταποκρινόμενος instead of ἀντικρινόμενος, our witness goes with the Lucianic recension, from which, however, the *Codex Alexandrinus* differs by following the majority text and Origen's recension.

Job 15:2a

ἆρα σοφός 3010] τίνα ἆρα σοφός *L*-406; πότερον σοφός B S C *O* etc. Ziegler.[71]

In Job 15:2 the main text reads πότερον σοφός, while the Lucianic recension reads τίνα ἆρα σοφός. Our manuscript attests the special reading ἆρα σοφός, which comes very close to the Lucianic recension.

The last two variants of Ra 3010, namely Job 15:1 and 15:5b, are nonspecific. They only show that Ra 3010 goes against *Codex Vaticanus* B as usual:

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66 For the second Lucianic sub-group, cf. Ziegler, *Iob*, 105–106, here esp. 106.

67 Ziegler, *Iob*, 15–16, here: 16: 'wichtiger Zeuge der lukianischen Hauptgruppe'. For the commentary on Job by Julian the Arian cf. in detail Albrecht, Markierte Intertextualität, 90–93 (§ 1. 'Die Identität des psign Interpolators').

68 Cf. Ziegler, *Iob*, 94, who notes in context of his presentation of Julian's commentary on Job, regarding the *Codex Alexandrinus*: 'Iul geht aber nicht immer mit A […]. Dies ist sehr oft zu beobachten, da A viele Sonderlesarten hat, die manchmal Verschreibungen sind'.

69 Cf. Ziegler, *Iob*, 94.

70 Divergent Ra 644^{c}: ἀμφιβάλλων.

71 Divergent Ra 644^{c}: πότερον τίνι σοφός.

Job 15:1

Ἐλιφάζ 3010 S C *O L* (*inter alia* A)] Ἐλιφάς or similar: B 253 etc. Ziegler.[72]

In Iob 15:1, Ra 3010 attests the reading of the majority text. In this specific case, this means that the Lucianic recension is in accordance with Origen's recension and also agrees with the *Codex Sinaiticus* and *Codex Ephraemi Syri rescriptus*.

Job 15:5b

οὐ 3010 C *O* etc.] καὶ οὐ *L* etc.; οὐδέν S; οὐδέ B′ *lI′*-336′-534′ etc. Ziegler.[73]

In Iob 15:5b, Ra 3010 attests οὐ, following Origen's recension and in accordance with *Codex Ephraemi Syri rescriptus*, while Ziegler prefers the reading of *Codex Vaticanus* B, i.e. οὐδέ.

3.4 Wisdom of Solomon (ed. Ziegler)

The Wisdom of Solomon (*Sapientia Salomonis*) has two characteristic readings (Wis 16:22c and 16:24a). A classification of our witness in the overall tradition is more difficult, because of the narrow text base.

Wis 16:22c

φλεγόμενον 3010 A B 248 etc.] φλέγον S C V *O* etc.

In case of Wis 16:22c, the association of our witness with Ra 248 points to Lucianic influence. It is worth noting that Ra 3010 always goes with Ra 248 in the variants to Proverbs, which we considered earlier.

Wis 16:24a

τῷ ποιήσαντι ὑπηρετοῦσα αὐτῶν (αὐτῶν pro αὐτόν) 3010; cf. τῷ ποιήσαντι αὐτόν C *mendose*;

τῷ ποιήσαντι τὰ πάντα ὑπηρετοῦσα 248] τῷ ποιήσαντι ὑπηρετοῦσα rel. (Ziegler).

In the case of Wis 16:24a, the verse reads in almost all manuscripts: ἡ γὰρ κτίσις σοὶ τῷ ποιήσαντι ὑπηρετοῦσα / ἐπιτείνεται εἰς κόλασιν ('For creation, serving you who made it, strains itself for punishment […]', NETS).

Our witness, however, reads: ἡ γὰρ κτίσις σοὶ τῷ ποιήσαντι ὑπηρετοῦσα αὐτῶν / ἐπιτείνεται εἰς κόλασιν ('For creation, serving you who made it, strains itself for punishment […]'). The αὐτῶν, added after ὑπηρετοῦσα, is nonsensical; it is surely a misreading of αὐτόν in αὐτῶν, which is based on quantity exchange between *omikron* and *omega*. The added αὐτόν is then to be understood as a complementary object to τῷ ποιήσαντι, although the position at the end of the verse is miserable. An addition to the object can be found in two other witnesses: on the one hand, in *Codex Ephraemi Syri rescriptus* (τῷ ποιήσαντι αὐτόν), which, however, does not offer a meaningful text, since it omits ὑπηρετοῦσα;[74] on the other hand, in the previously mentioned Ms. Ra 248, which complements τὰ πάντα and thus reads: ἡ γὰρ κτίσις σοὶ τῷ ποιήσαντι τὰ πάντα ὑπηρετοῦσα / ἐπιτείνεται εἰς κόλασιν.[75] ('For creation, serving you who made everything, strains itself for punishment […]').

3.5 Sirach (ed. Ziegler)

Finally, we turn to the book of Sirach. The tradition of the Greek Sirach is complicated. Ziegler distinguishes two Greek translations:[76] first, the translation of Sirach's grandson, GrI, which is handed down in the Greek

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[72] For the variants in detail, cf. Ziegler's edition in the apparatus *ad locum*.

[73] For further *variae lectiones minores,* cf. Ziegler's edition in the apparatus *ad locum*.

[74] Ziegler notes in the apparatus *ad locum* that *Codex Ephraemi Syri rescriptus* is probably influenced by Wis 15:11 (ὅτι ἠγνόησεν τὸν πλάσαντα αὐτόν).

[75] Ziegler notes in the apparatus *ad locum* that Ra 248 is probably influenced by Wis 9:1 (Θεὲ πατέρων καὶ κύριε τοῦ ἐλέους ὁ ποιήσας τὰ πάντα ἐν λόγῳ σου).

[76] Cf. Ziegler, *Sapientia Iesu*, 69–84, here esp. 83.

manuscripts; second, a later translation, GrII, which has left traces in the Origenic and Lucianic recensions. It is close to the Hebrew Sirach fragments and was, according to Thiele, the *Vorlage* of the *Vetus Latina*.[77] The importance of the *Vetus Latina* is emphasized by Ziegler in his text-historical introduction to the Greek Sirach:

'[...] it often introduces readings that are not in any of the Greek manuscripts we know, but certainly once existed in Greek form. Perhaps a lucky find will give us at least a few fragments that form the *Vorlage* of La and deliver Greek readings that as yet are only available in Latin'.[78]

In Sirach, our manuscript testifies to several significant variants, which allow some comments to be made on the value of the manuscript. In particular, the first variant would certainly have pleased Ziegler, because it is a lucky find of the kind he described:

Sir 3:1 in.

Titulus + Περὶ π[…]σαν 3010] > rel., sed cf. *Vetus Latina*

Before chapter 3, Ra 3010 transmits the remnants of a subtitle ('Zwischentitel'). In the Greek primary tradition, there is no indication of this. The *Vetus Latina*, however, attests in parts of the tradition the subtitle '*de honore parentum*'.[79] This example shows the special value of the *Vetus Latina* for the book of Sirach. Our witness confirms that the reading, which was previously testified only in Latin, is based on a Greek *Vorlage*.

A study of the subtitles in the Greek Sirach shows that these occur in the manuscript tradition very irregularly, and none of the known manuscripts, let alone the recensions, provides consistent subtitles. In the first seventeen chapters of the Greek Sirach, apart from the instance mentioned in our text, only one subtitle (Περὶ ὑπομονῆς) is extant to Sir 2:1 *in*., namely in Ms. Ra 248, which is considered the main witness of the Lucianic recension in Sirach. The *Vetus Latina*, however, has no title before Sir 2:1. This evidence reminds us to be cautious in text-historical judgments.

Sir 3:7a, Sir 26:19–27

Sir 3:7a deest 3010 B, S, A, C, V etc.] sed hab. *O L* 694-743-768.
Sir 26:19–27 desunt 3010 B S A V O etc.] sed hab. *L*-743.

A special feature of the GrII-tradition are smaller and larger additions. Such additions cannot be found in our text. This can be demonstrated in two places, namely in Sir 3 and Sir 26. The absence of the half-verse Sir 3:7a and the verses Sir 26:19–27 in our group of witnesses is an important indication that Ra 3010 belongs in fact to the GrI-tradition, because Sir 3:7a and Sir 26:19–27 are among the additions that come from GrII into the Greek tradition of Sirach, which Ziegler has included in the main text of his edition in small print.[80]

Sir 3:23b

ἀνθρώπου ὑπεδόθη 3010] ἀνθρώπων ὑπεδείχθη B S A V *O L* Ziegler.

In Sir 3 another variant is attested, namely in v. 23b. This verse reads according to the Septuagint: πλείονα γὰρ συνέσεως ἀνθρώπων ὑπεδείχθη σοι ('for things beyond human understanding have been shown to you', NETS). Our witness, however, reads ἀνθρώπου ὑπεδόθη instead of the mainly-attested ἀνθρώπων ὑπεδείχθη. This reading is attested in such a manner only in Ra 3010. However, the singular ἀνθρώπου instead of the plu-

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[77] Cf. VL 11/2, 101.

[78] Ziegler, *Sapientia Iesu*, 74: ‚[…] häufig bringt sie Lesarten, die in keiner der uns bekannten griech. Handschriften stehen, aber sicher einmal in griech. Form vorhanden gewesen sind. Vielleicht beschert uns ein glücklicher Fund wenigstens einige Fragmente, die die Vorlage von La bilden und griech. Lesarten überliefern, die bis jetzt nur in lat. Sprache vorliegen'.

[79] Cf. VL 11/2, 221 in the apparatus *ad locum* with reference to Clement of Alexandria, *Stromata* VI,146,1–2: Ὁ δὲ πέμπτος ἐξῆς ἐστι *λόγος περὶ τιμῆς πατρὸς καὶ μητρός*. πατέρα δὲ καὶ κύριον τὸν θεὸν λέγει σαφῶς. διὸ καὶ τοὺς ἐπιγνόντας αὐτὸν υἱοὺς ἀναγορεύει καὶ θεούς. κύριος οὖν καὶ πατὴρ ὁ κτίστης πάντων, μήτηρ δὲ οὐχ, ὥς τινες, ἡ οὐσία ἐξ ἧς γεγόναμεν, οὐδ', ὡς ἕτεροι ἐκδεδώκασιν, ἡ ἐκκλησία, ἀλλ' ἡ θεία γνῶσις καὶ ἡ σοφία, *ὥς φησι Σολομών*, μητέρα δικαίων ἀνακαλῶν τὴν σοφίαν. καὶ ἔστι δι' αὐτὴν αἱρετή. πᾶν τε αὖ τὸ καλὸν καὶ σεμνὸν παρὰ τοῦ θεοῦ δι' υἱοῦ γιγνώσκεται. Clement of Alexandria thus combines the fifth commandment (τίμα τὸν πατέρα σου καὶ τὴν μητέρα, Ex 20:12) with Sir 3.

[80] Cf. Ziegler, *Sapientia Iesu*, 69.

ral ἀνθρώπων is testified by three minuscules (Ra 296-548, 336) and the *Vetus Latina*; and ὑπεδόθη instead of ὑπεδείχθη can be found elsewhere, if only in a single witness, namely in *Codex Ephraemi Syri rescriptus*. The text at hand shows that Ra 3010 is a valuable witness to the fact that there used to be ancient traditions that have been handed down only through randomly-preserved textual witnesses such as the two palimpsest manuscripts we have mentioned (*Codex Ephraemi Syri rescriptus*, Ra 3010).[81]

Sir 16:27d

αὐτοῦ 3010 *L'*-672-743 728] αὐτῶν rel. (B S A V *O* etc.) Ziegler.

In Sir 16:27d, it can be seen that Ra 3010 agrees with the Lucianic recension against the rest of the tradition. Our witness reads αὐτοῦ instead of αὐτῶν. However, one has to say that such a reading is hardly meaningful, since this type of variance is not typical of recensions.

Sir 26:18b, 27:1a

Lastly, we come to two passages where our witness follows the majority text, though not considered original by the editors: Sir 26:18b and 27:1. It is really not surprising that Ra 3010 does not attest the text that is provided by *Codex Sinaiticus* as original reading:

26:18b στέρνοις (-νους 3010 254) B S^{c} A V *O L* etc. Rahlfs] πτέρνοις S* etc. Ziegler.
27:1a ἀδιαφόρου 3010 B S^{c} A V *O L* etc.] διαφόρου S* etc. Rahlfs Ziegler.

4. THE STICHOMETRY OF RA 3010 IN ECCLESIASTES: A CASE STUDY

After this examination of variants from Ra 3010, we would like to add a few observations about the stichometry. Here, we confine ourselves to Ecclesiastes. There is a special characteristic, namely the particular stichometry of the manuscript, which interestingly coincides with a part of the tradition that is influenced by the Hexaplaric tradition; we shall give one example.

In Ecclesiastes, the stichometry of our witness resembles to a large extent that which is offered by Ms. Ra 252, i.e. *Codex Florentinus*, Biblioteca Medicea Laurenziana, Plut. 8.27 (*Diktyon* 16085) from the 10th century.[82] The manuscript contains Job, Proverbs, Ecclesiastes, and Song of Songs, accompanied by scholia and Hexaplaric marginal notes.

For Ecclesiastes, Ra 252 is (beside Ra 788) the oldest witness of the manuscript tradition that has preserved Hexaplaric marginal notes (Ra 161, 248, 252, 336, 411, 539, 788). According to Gentry, the carriers of the Hexaplaric marginal notes in the textual tradition of Ecclesiastes do not belong to clear groups: Ra 252 is assigned to the group of witnesses that Gentry calls the A-text (A-C-155-252-296-548-549).[83] According to his remarks on the characteristics of the A-text, A, C, 155, 252, and 549 all went back to a common ancestor.[84] However, the stichometric differences make it hard to believe that these manuscripts, which have a loose association with the *Codex Alexandrinus*, can be assigned to a common group or even descend from a common ancestor.

In fact, the stichometric correspondence of our witness with the oldest exponent of that lineage based on the Hexaplaric tradition, notably Ms. Ra 252, shows that the close relationship of our manuscript to the Mss. Ra 161-248, which was previously observed in the spectrum of variants, is not a random one: our witness seems to be very closely related to the Lucianic group of manuscripts, which have preserved Hexaplaric material.

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[81] The other palimpsest manuscripts that contain the *libri sapientiales* of the Septuagint are manuscripts Ra 600, 626, 825, 826, cf. Albrecht, Palimpsesthandschriften; and the palimpsest manuscripts that have been described by Martin Flashar, i.e. the Job fragments of Ra 406, and the Sirach fragments of Ra 929, cf. Rahlfs, Palimpsest-Fragmente.

[82] Cf. Rahlfs, *Verzeichnis*, 67.

[83] Cf. Gentry, *Ecclesiastes*, 57; Gentry, *Text History*, 105–106.—In his apparatus, however, Gentry records Ra 252 under al = *alia manuscripta*.

[84] Cf. Gentry, *Ecclesiastes*, 58; Gentry, *Text History*, 106.

5. TEXTUAL HISTORY

Based on the previous observations, we would like to conclude with an attempt to classify our manuscript, which, because of its early date, can undoubtedly be counted among the group of rather important witnesses to the Greek wisdom books, the so-called *Libri sapientiales* of the Septuagint.

In the case of Proverbs, the observed tendency of our manuscript is to go against the text of *Codex Vaticanus* B and to agree with two significant minuscules that stand in the Hexaplaric tradition (Ra 161-248). A closer characterization of these textual witnesses is still pending:[85] in Sirach and Wisdom of Solomon, Ziegler has assigned the text-type of those manuscripts to the Lucianic recension. It is striking that these manuscripts supply Hexaplaric notes, and thus are clearly dependent on the Hexplaric tradition, but without belonging to Origen's recension.[86] Origen's recension seems to be present for Proverbs in the Syrohexapla and in *Codex Venetus* 'V'. It is noteworthy that the Syrohexapla in the three cases considered here goes together with *Codex Venetus* 'V'; this indicates that both witnesses form the *O*-group, not only in Ecclesiastes, but also in Proverbs.[87] The way in which Origen's recension and the Lucianic recension are related to each other in the Greek book of Proverbs requires, of course, an in-depth investigation that is still pending.[88]

For Ecclesiastes, we were able to observe, on the basis of the three noteworthy verses examined, that the readings offered by Ra 3010 can be called Lucianic. In particular, from Eccl 2:26b it became clear that Ra 3010 goes with the same group of manuscripts, which can already be found in Proverbs (Ra 161-248). In addition to this comes Ms. Ra 252, whose stichometry in the case of Ecclesiastes closely follows that of Ra 3010. The commonality of these three manuscripts is that they belong to the Lucianic group and have preserved Hexaplaric material in the form of marginal notes.

In the case of Job, our manuscript is clearly assigned to the Lucianic recension. It mostly goes with the *Codex Alexandrinus*, which largely represents that recension in the book of Job. Ra 3010 (7th century) thus takes the side of the two main old witnesses to the Lucianic recension in Job: *Codex Alexandrinus* (5th century) and *Codex Venetus* 'V' (8th century); the latter, however, starts only at Job 30:8.

For the Wisdom of Solomon, a text-historical classification is difficult, because the narrow variant base is scarcely sustainable. It is at least worth noting that the well-known Ms. Ra 248, in one of the two cases (Wisdom of Solomon 16:22c), goes with Ra 3010.

Finally, in the case of Sirach, the variants are more numerous, which in turn facilitates the classification. It is clear that our witness belongs to the GrI-tradition, that is to say, the old translation of the book, dating back to Sirach's grandson. The Lucianic influence of Ra 3010 is also unmistakable in Sirach. Most interesting is the subtitle before Sir 3:1, which is otherwise preserved only in the *Vetus Latina*. Strikingly, in the first 17 chapters of Greek Sirach, only one more subtitle is attested, namely before Sir 2:1. This can be found in Ms. Ra 248, the main witness to the Lucianic recension of Sirach.

CONCLUSION

The decipherment of the Turin fragments would have been impossible without enhanced multispectral photographs of the highest quality. Nonetheless, we are aware that the material conditions of the badly-damaged fragments require further restoration, and a subsequent new photographic campaign covering the entire bulk of fragments is desirable, which would undoubtedly make it possible to recover other portions of the Biblical text and to reconstruct the codicological structure of all the extant folios (30).

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[85] Gentry, Late Syriac Translations, 220, mentions both witnesses, i.e. Ra 161-248, in his excellent overview of the (Syro-)Hexaplaric tradition in Job, Proverbs, Song of Songs, and Ecclesiastes, without giving a text-historical classification of these two manuscripts.

[86] The same phenomenon is well attested for the prophetic books; concerning the Lucianic recension in Ezechiel, cf. Wevers, The L Text, 115: '[…] *L* based his work using as his parent LXX text an *O* ms which contained hex signs in large number […]'; and concerning Isaiah, cf. Munnich, Le texte lucianique.

[87] Cf. for the *O*-group in Ecclesiastes, Gentry, Late Syriac Translations, 222. For Proverbs, Gentry leaves the classification open, cf. ibid. 223: 'It will be interesting to see how the evidence for the Syro-Hexapla in Proverbs and Canticles does or does not line up with the text of the LXX^{O} group.'

[88] The article by Meade, Proverbs gives a first orientation.

The provisional analysis that we were able to make of the Turin palimpsest allows a cautious conclusion: the original provenance of the old parchment leaves reused by Baiophoros seems—particularly on a textual basis—not to have been Constantinople. It is quite possible, in our opinion, that the *codex antiquior* has its origin in the East of the Byzantine empire, and arrived at a later time at the Prodromos Monastery of Petra—maybe at the time of the Komnenian dynasty,[89] or in the early Palaiologan period, when George of Cyprus (from 1283 patriarch Gregory II) moved to Constantinople, where he received both the monastic tonsure and the order of the diaconate precisely in that monastery.[90]

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[89] The interests of the Komnenoi in Cyprus in the 12th century may have affected Byzantine book production: Gamillscheg, Fragen zur Lokalisierung, 313–321.

[90] Georgius Pachymeres, *Συγγραφικαὶ ἱστορίαι*, VII 14, ed. Failler 1999, 52–56, particularly 55 and fn. 13.

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New Light on the Gothic Palimpsest from Bologna*

INTRODUCTION

Nine fragmentary manuscripts, preserved in different European libraries, transmit texts in the script and language of the Goths.[1] They were most probably written or circulated in Italy during the period of the Ostrogothic kingdom (493–553), where they were used for liturgical purposes.[2] Seven of them are palimpsests, overwritten in Italian *scriptoria* with Latin texts between the second half of the 7th (in one case even earlier, see below) and the first quarter of the 8th centuries.[3]

The reason for the extensive reuse of Gothic manuscripts was not only economic. After the end of the war with the Byzantines (553) and the linguistic and religious assimilation of the remaining Goths to the Latin population, the Gothic texts were deprived of their public. In addition, they reflected, directly or indirectly, the Arian (Homoian) belief of the Goths, diffused also among the Langobards in the first period of their domination in Italy. Therefore, it cannot be excluded that the erasing of the Gothic texts is closely connected with the Langobards' conversion to Catholicism and, consequently, with the need to delete unorthodox books.[4]

Today, all these palimpsests are in a poor condition: one of the reasons is the use by previous generations of scholars of reagents to make it easier to decipher the underlying texts. Both Angelo Mai, who discovered the Gothic texts in the Ambrosian Library of Milan (from 1813),[5] and Carlo Ottavio Castiglioni, who assisted him in deciphering the texts and prepared them for publication (between 1819 and 1839[6]), used a mixture based on nutgall. This practice was also applied to the four leaves preserved in Turin (part of the ms. *Ambrosianus* A), discovered in 1866 by August Reifferscheid.[7] In subsequent years, Amedeo Peyron used a mixture of reagents (the so-called 'Gioberti's tincture'), primarily based on potassium ferrocyanide, to attempt to decipher the

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1 The Gothic corpus, which includes long sections of the 4th-century Bible translation by Wulfila, has been edited several times. The latest edition of 2000 (Streitberg with Scardigli, *Gotische Bibel*) is a reprint of the edition by Streitberg (1919), with some additions. The Bologna fragment, discovered in 2009, is—of course—not included.

2 Details in Falluomini, *Gothic Version*, *passim*.

3 The seven Gothic palimpsests are: *Codex Ambrosianus* A (Milan, Biblioteca Ambrosiana, S 36 sup.; 102 leaves) + *Codex Taurinensis* (Turin, Biblioteca Universitaria Nazionale, F. IV. 1 Fasc. 10; 4 leaves); *Codex Ambrosianus* B (Milan, Biblioteca Ambrosiana, S 45 sup.; 78 leaves); *Codex Ambrosianus* C (Milan, Biblioteca Ambrosiana, I 61 sup., ff. 90, 91); *Codex Ambrosianus* D (Milan, Biblioteca Ambrosiana, G 82 sup., ff. 209/210, 451/452, 461/462); *Codex Ambrosianus* E (Milan, Biblioteca Ambrosiana, E 147 sup., ff. 77/78, 79/80, 111/112, 113/114, 309/310) + Vatican City, Biblioteca Apostolica Vaticana, Vat. lat. 5750, ff. 57/58, 59/60, 61/62); *Codex Carolinus* (Wolfenbüttel, Herzog August Bibliothek, Guelf. 64 Weiss., ff. 255, 256, 277, 280); *Codex Bononiensis* (Bologna, Archivio della Fabbriceria di San Petronio, Cart. 716/1, n° 1, *olim* 353; 2 leaves).

4 Zironi, *Monastero longobardo*, 67–68.

5 Lo Monaco, In codicibus, 681–682.

6 Mai and Castiglioni, *Ulphilae partium* (this preliminary publication includes *specimina* from different Gothic palimpsests); Castiglioni, *Ulphilae Gothica*; Castiglioni, *Gothicae ... ad Romanos*; Castiglioni, *Gothicae ... ad Galatas*; Castiglioni, *Gothicae ... ad Thessalonicenses*.

7 The discovery was reported by Pfeiffer, Germanistische Funde, 973–974.

fragment.[8] In 1936, Jan de Vries published a facsimile edition of the Ambrosian manuscripts which testifies to the poor state of their script. Like the Milan and Turin leaves, the Vatican fragments (part of the ms. *Ambrosianus* E) were also treated—under the direction of Angelo Mai—with tincture of nutgall, in order to decipher the underlying text. The photographic reproduction of 1906[9] shows the bad state of the Vatican palimpsest.

As may be expected, the condition of the Gothic manuscripts has not improved since these endeavours, and in several places the writing is now illegible to the naked eye. The combination of scraping—to enable reuse of the parchment in the Middle Ages—and reagents have resulted in the loss of the *scriptio inferior*. The marginal glosses and annotations are in a similar bad condition. Fourteen Gothic annotations to a Latin liturgical manuscript,[10] which transmits mostly Arian texts, have been heavily scraped at an unspecified point in time, and only a few traces of the script remain. Curiously, the fifteen Arian sermons of ff. 40r–77v have not been erased. Presumably the Gothic script represented a more direct and evident connection with the heretical belief than the Latin texts.

More fortunate has been the fate of the *Codex Carolinus*, which suffered from minor damage in the Herzog August Bibliothek of Wolfenbüttel, where it was discovered in 1755. Franz Anton Knittel, who deciphered and published the text in 1762,[11] refrained from using chemical reagents.[12] The online digitalised images of these leaves show how the *scriptio inferior* is still clearly legible.[13]

The palimpsest from Bologna, a parchment bifolio (ca. 330 × 480 mm), was discovered in 2009 in the archive of the Fabbriceria of San Petronio in Bologna, where it is still preserved.[14] The Latin *textus superior*, which is part of the eighth book of Augustine's *De civitate Dei*, covers another—hitherto unknown—text, in Gothic script and language. Rosa Bianca Finazzi and Paola Tornaghi, who published the *editio princeps* in 2013, called this find *Gothica Bononiensia*.[15]

On the basis of cultural considerations and of palaeographical and codicological analysis, the Gothic fragment from Bologna may be dated to the first half of the 6th century. It was overwritten in a northern Italian centre (Verona?) with Augustine's text, between the end of the 6th and the first half of the 7th centuries.[16] Its subsequent history is unknown, until its reuse as the cover for a booklet of accounts in 1635 (according to the date on the booklet). The fragment is now in a poor condition: the *scriptio inferior*, although not treated with chemical reagents, is extremely faded and is often hidden by the overwritten Latin letters. In addition, the parchment is covered by some modern scripts and heavy smudges.

Considering the scanty attestations of the Gothic language, the importance of the Bologna fragment is enormous, not only for Germanic philologists and linguists, but also for church historians and medievalists. Unlike almost all the Gothic manuscripts, it does not transmit part of Wulfila's Biblical translation. According to the present state of research, it represents the only original, i.e. non-translated, text in Gothic (probably a sermon or liturgical prayer). For this reason, it seemed highly desirable to decipher it in full, as it could offer new insights into the language and culture of the Goths.

More generally, the investigation of the Gothic palimpsests with modern technologies appears now to be essential in order to provide a new edition of their texts. In the last ten years, some preliminary tests on these important witnesses of the early medieval written culture have shown how fruitful such a multispectral analysis

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8 Bellocchio and Dolcetti Corazza, Codex Taurinensis, 70.

9 Ehrle, *M. Cornelii Frontonis et aliorum reliquiae*, 57–62.

10 Verona, Biblioteca Capitolare, LI (49) + Venice, Collezione Giustiniani Recanati, CE 12.16 (end of the 5th/beginning of the 6th century). The Latin manuscript originally transmitted twenty-seven annotations, see Gryson, *Le recueil arien* (with photographical reproductions); Falluomini, Un codice miscellaneo.

11 Knittel, *Ulphilae versio Gothica.*

12 Lo Monaco, In codicibus, 667 and 671.

13 http://diglib.hab.de/wdb.php?dir=mss/64-weiss (accessed 01.07.2023).

14 The fragment was found by Armando Antonelli, who gave the first transcription and analysis of the *textus superior*. The *scriptio inferior* was discovered by Maddalena Modesti and Annafelicia Zuffrano in 2010: see the history of the discovery and the description of the palimpsest in Aimi *et al., Frammento bolognese*. Images of the fragment were sent to the Vatican Library, where Delio Vania Proverbio, the *Scriptor Orientalis*, recognised the *scriptio inferior* as Gothic (Finazzi and Tornaghi, *Gothica Bononiensia*, de la découverte, 30).

15 Subsequent editions, based on new images of the fragment, were published in 2014 (Falluomini, Zum gotischen Fragment) and in 2017 (Falluomini, Zum gotischen Fragment II). The reading of some letters is still doubtful.

16 Modesti, Tra Goti, 75.

could be.[17] As the following pages will show, new data have also emerged from the multispectral, spectrographic, and philological analysis of the Gothic fragment from Bologna, conducted by the team of the CIMA (Simon Brenner and Bernadette Frühmann, under the direction of Heinz Miklas) and by myself in February 2018.

[C. Falluomini]

MULTISPECTRAL ANALYSIS

Multispectral Imaging (MSI) has proven a valuable tool for the recovery of faded or erased text in historic manuscripts.[18] By extending both the spectral range and the spectral resolution of human vision, which is restricted to about 400 to 700 nm and relies on only three distinct colour receptors for red, green, and blue, the contrast between visually similar surface points can be increased. In the case of the fragment of Bologna, the challenge was to increase the readability of the Gothic underwriting of the palimpsest, i.e. to emphasise the difference between the *scriptio inferior* and the background, as well as the difference between the *scriptio inferior* and the *scriptio superior* in areas where they are closely interlaced.

This fragment was imaged with CIMA's portable Multispectral Imaging system,[19] which is shown schematically in Figure 1a. In the imaging process followed, the manuscript is illuminated with multispectral LED panels capable of producing eleven narrow spectra in the ultra-violet (UV), visible and near-infra-red (NIR) ranges. The individual spectra are shown in Figure 1b. The light reflected from the manuscript is recorded with an achromatic middle format camera (Phase One IQ260 Achromatic), which provides a resolution of 60MP and a spectral response from UV to NIR radiation. An optical filter wheel in front of the camera lens enables the application of a UV-blocking or -permitting filter, thus enabling the acquisition of a UV-fluorescence and -reflectography image respectively. Additionally, a true colour image and raking-light images under white LED illumination as well as a colour-separated UV-fluorescence image are acquired using a full-format RGB camera (Nikon D4). To enable a full automation of the acquisition despite the use of two cameras, a linear unit moves the manuscript back and forth between them.

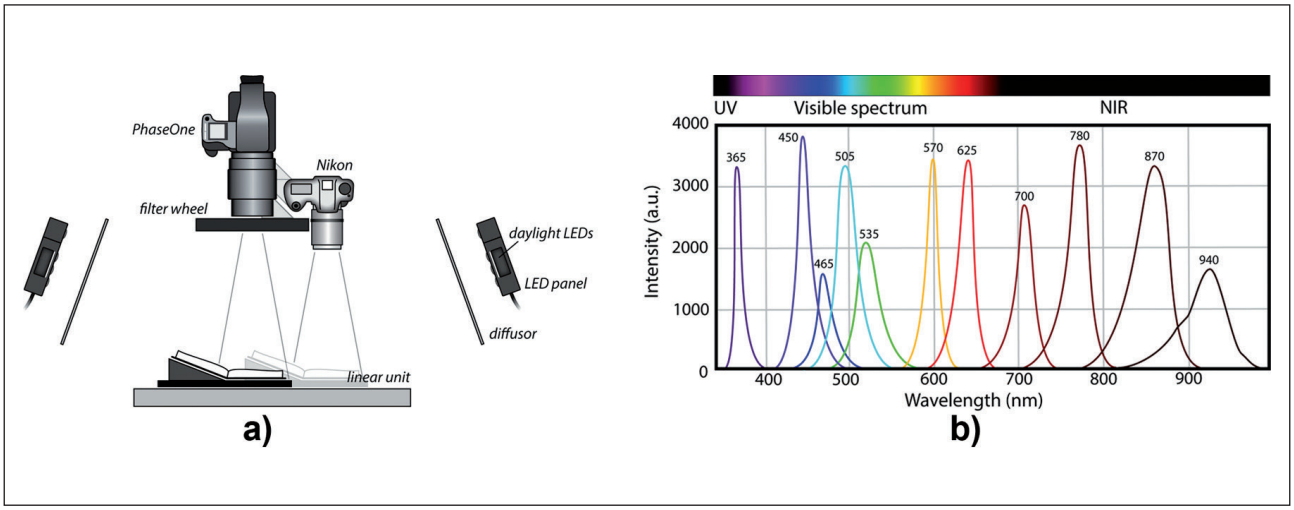

Fig. 1: a) schematic of MSI setup; b) spectra used
(© Simon Brenner, TU Wien)

[17] See Falluomini, Glosse gotiche.
[18] See Arsene *et al.*, High Performance Software, 73–96; Mindermann, *Hyperspectral Imaging*.
[19] Hollaus *et al.*, Investigation of Ancient Manuscripts, 93–96.

As the chemical analysis will show (see below), both the Latin *scriptio superior* and the Gothic *scriptio inferior* are written in iron gall ink. As these types of ink inhibit the fluorescent properties of the parchment where applied, their residues typically show the highest contrast in UV fluorescence images. Figure 2 shows an example where the visibility of the *scriptio inferior* is already improved in the UV fluorescence image. However, *scriptio inferior* and *scriptio superior* appear very similar in this image, making highly interlaced passages difficult to read. This problem can be addressed by using the information contained in all of the acquired images by means of statistical methods.

A prerequisite for such statistical operations on pixel level is the accurate alignment of the individual layers, i.e. a given pixel position corresponds to the same point on the physical object in each of the MS layers. Aberrations from this perfect alignment are caused by chromatic aberration (different refraction angles for different wavelengths in the camera lens), changing of optical filters, mechanical impacts, or deformation of the manuscript itself due to changes in temperature and humidity. To be able to compensate for all of those error sources, a deformable region-based image registration using the MIND descriptor[20] was used. This approach was originally designed for the registration of multi-modal medical images, where similar problems are faced.

Principal and Independent Component Analysis (PCA and ICA) are well-known methods for the transformation of the information contained in a multispectral image stack to a set of components, which are statistically uncorrelated or independent respectively. This helps to isolate different sources of information, which in the case of a manuscript refers to the different layers of text and the substrate. The information contained in the MS images can thus be condensed to a few expressive component images.

The combination of different MS layers or statistical components in false colour images allows the simultaneous display of different aspects of an image, leading to an increased level of interpretability. See Figure 2c for an example, where the UV-fluorescence image, the broadband-illuminated image, and the independent component that is isolating the *scriptio inferior* are displayed in the R, G, and B channel of a colour image. Note that the *scriptio superior*, *scriptio inferior*, and background are shown in clearly distinguishable colours.

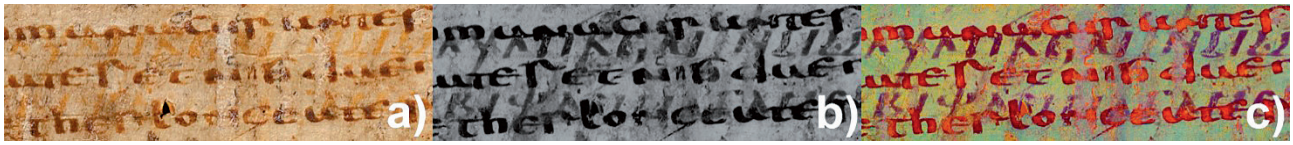

Fig. 2: Bologna, Cart. 716/1, n° 1, f. 2r, lines 20–21,
a) true colour image; b) UV-fluorescence image (achromatic); c) false colour image (© Simon Brenner, TU Wien)

However, in the most challenging parts of the fragment, including line 15 on folio 1v which will be addressed in this paper, PCA and ICA were not able to sufficiently increase the contrast of the *scriptio inferior*. We therefore applied the Linear Discriminant Analysis (LDA), which is a supervised machine learning method for classification. Supervised, in this context, means that the algorithm has to be provided with examples of pixels that are labelled with the class they belong to. Although Hollaus *et al*.[21] proposed a method for automatic labelling, it was not applicable here, due to the close spatial arrangement of the two layers of text. We therefore resorted to a manual labelling of examples for the *scriptio superior*, *scriptio inferior*, and background, by brushing. The classifier trained with the examples provided then predicts a class for each pixel of the MS image, accompanied by a prediction confidence. These per-pixel class confidences can in turn be interpreted as images and displayed in false colours.

[20] Heinrich *et al.*, MIND, 1423–1435.
[21] Hollaus *et al.*, Enhancement of Multispectral Images, 145–149.

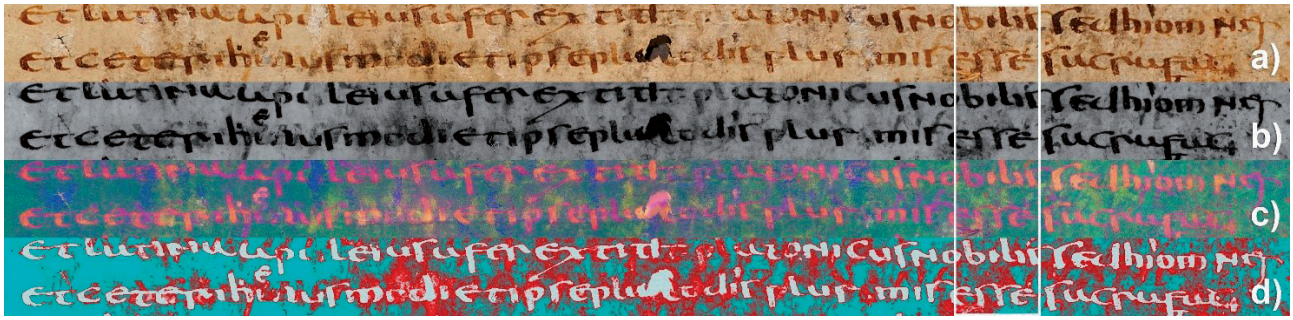

Fig. 3: Bologna, Cart. 716/1, n° 1, comparison between the natural colour image (a), the UV fluorescence image (b), a false colour image based on principal components (c), and a false colour image based on LDA confidences (d).
Note while the LDA result is still difficult to read due to some considerable background noise, it is the only result that clearly shows the letters of the *scriptio inferior* in a distinctive colour
(© Simon Brenner, TU Wien)

[S. Brenner]

MATERIAL ANALYSIS

In addition to Multispectral Imaging, the CIMA team employed X-ray Fluorescence analysis (XRF) for the material investigations of this Gothic fragment.[22] This analytical method was used in a manner that is non-destructive and non-invasive, meaning that there were no changes made to the objects in any way before, during, or after the investigations. This analysis provides details regarding the chemical elements present in the area of interest. However, the great penetration depth of X-ray radiation must be considered (approx. 1 mm for parchment). While the simultaneous measurement of the support and rear of a folio cannot be avoided, further penetration into deeper layers of the manuscript or supporting cardboard can be avoided using a PMMA (polymethyl methacrylate) plate. Furthermore, in many cases the diameter of the X-ray beam is wider than the character-stroke. Therefore, it is essential to select the area of analysis carefully in order to avoid possible interference from or influence by surrounding materials. In order to understand the results from the points of interest (e.g. paint or ink layers), the spectra from the unpainted parchment must always be subtracted.

The investigations in this project were executed with a spectrometer Type ELIO (by XGLab, Milan, Italy), which is a device designed for application in the field of arts. The system head consists of a 4 Watt X-ray rhodium (Rh) tube and a silicon drift chamber detector (SDD) with an active area of 25 mm² enclosed by a thin beryllium window. The X-ray beam has a diameter of about 1 mm, ideal for investigating small lines, e.g. in the script. Two integrated laser pointers of the positioning system (690 nm) enable the selection of the area of analysis and adjustment of the point of focus (optimal working distance) between the instrument and the object. Their intersection coincides with the axes of the stimulating X-ray beam and the detector. These operations can be performed and recorded automatically by the integrated camera of the instrument (examples are shown in Fig. 5a–d). The settings for the measurements of this fragment were of 40 kV, 60 µA, and 60 seconds acquisition time. The results were processed using the Elio Software version 1.6.0.29. The XRF measuring head is mounted on a tripod and can thus be safely positioned over the object (Fig. 4).

[22] On chemical materials analysis carried out by CIMA researchers see Frühmann *et al.*, Multianalytical Approach; Frühmann *et al.*, Zur Bestimmung der Tinten. The resulting information facilitates the understanding of the manufacturing process of a manuscript, including support (parchment), inks, pigments, dyes, and binding media. The chemical investigations are expected to expand our knowledge of the materials used for the manuscripts, and—collected and compared in a database—to contribute to the dating and localising of the objects.

Fig. 4: a) portable XRF spectrometer Elio during the measurements of the fragment Cart. 716/1, n° 1 in Bologna; b) f. 2v: measurement points in the parchment (MP1), *scriptio superior* (MP2, 4 and 5), *scriptio inferior* (MP3), as well as the marginal notes (MP6 and 7) (© Bernadette Frühmann *et al.*, Academy of Fine Arts Vienna)

However, there are several limitations in the application of XRF for the identification of inks and pigments. The analyses were done in air; for this reason, the peaks of the argon K-lines are always present in the spectra. Furthermore, only elements with an atomic number higher than 16 (sulphur) can be detected by XRF in air. Consequently, only inorganic components can be characterised. It is also barely possible to characterise and identify mixtures of inorganic pigments.

The XRF analyses of the parchment yielded elements like sulphur (S), low intensities of chlorine (Cl), potassium (K) and iron (Fe), but high amounts of calcium (Ca). Calcium probably derives from the treatment of the parchment with lime ($Ca(OH)_2$) during the manufacturing process, or from whitening the folio with chalk ($CaCO_3$) before usage. Low values of potassium (K) are intrinsic to the chemical composition of the parchment, as well as sulphur (S). Iron (Fe) is present due to the parchment preparation (removal of the hair with an iron knife or polishing of the skin).[23]

[23] Thompson, *Materials and Techniques*, 24–30.

The XRF results of the investigations of the black/brown inks in the *scriptio superior* showed higher amounts of iron (Fe) compared to the parchment, in combination with sulphur (S) and potassium (K), as well as small amounts of copper (Cu) (Fig. 5). This can be related to iron gall ink[24] which would have contained copper. The marginal notes on f. 2v (MP6 and MP7) show small differences in the ratio of potassium (K) and iron (Fe) in comparison with the *textus superior* (Fig. 5e), which proves that different inks were used. However, the spectra of MP6 and MP7 are identical.

XRF investigations of the *scriptio inferior* reveal only iron (Fe) on the *recto* as well as *verso* side of the folio. An example is shown in Figure 5c. This may also be an indication of the application of iron gall ink. As the ink is for the most part almost deleted from the parchment, identification is rather difficult.

On the left side of f. 1v, a cross is detectable between the lines in the upper part of the text (Fig. 5d), which has a dark brown/black colour, different from the Latin text. The XRF results yielded only very small differences to the parchment, which indicates a carbon black ink in this case.

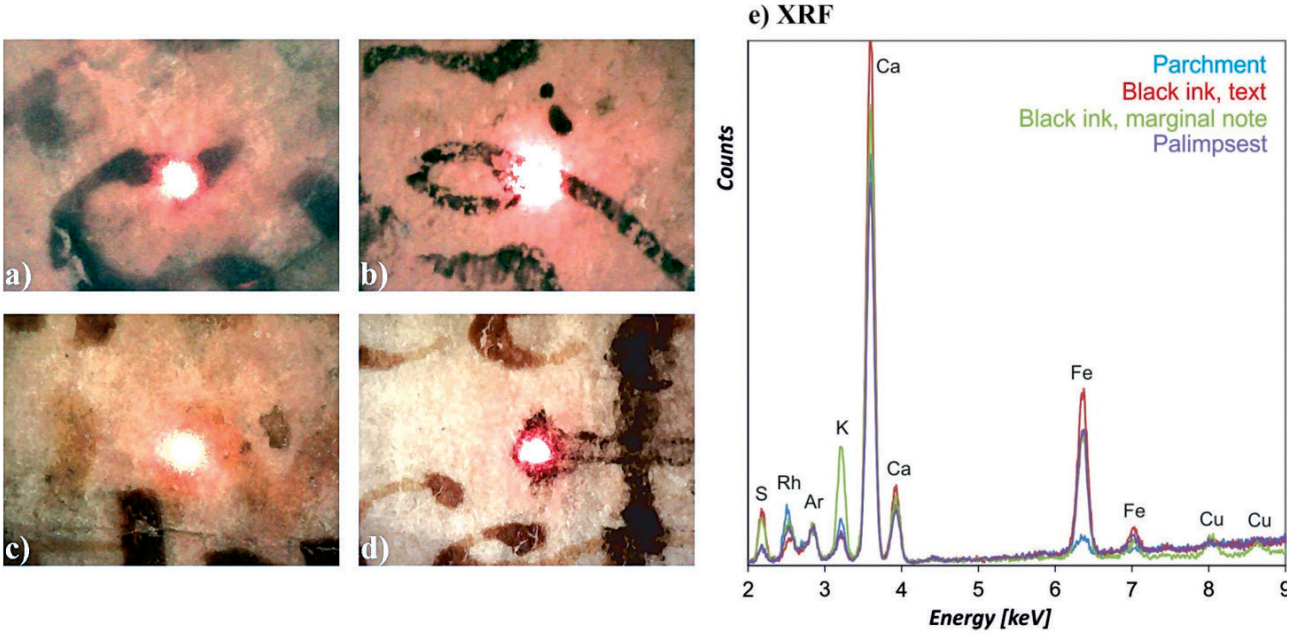

Fig. 5: images of the investigated areas and XRF spectra of the measurements in the fragment Cart. 716/1, n° 1. a) measurement point (MP) in the brown-black *scriptio superior*, red spectrum in e); b) MP in the marginal note, green spectrum in e); c) MP in the *scriptio inferior*, yellow spectrum in e); d) MP in the black ink of a cross symbol between the lines on the left side of f. 1v; the results are similar to the parchment—therefore a carbon black ink is likely; e) XRF spectra of the inks compared with the spectrum of the parchment (blue). The elements S (sulphur), K (potassium), Fe (iron), and Cu (copper) are characteristic for iron gall ink. The varying ratios of K/Fe correspond to the application of different inks
(© Bernadette Frühmann *et al.*, Academy of Fine Arts Vienna)

The XRF results for this fragment verified the identification of three different inks: an iron gall ink containing copper (Cu) in the Latin *scriptio superior*, an ink of similar composition but different ratio between potassium (K) and iron (Fe) in the more recent marginal notes, and a carbon-based ink for the symbol between the text lines. The ink of the *scriptio inferior* was most likely an iron gall ink as well, but due to the low levels present, it cannot be described in detail.

[B. Frühmann]

[24] Hahn, Analyses of Iron, 41–64.

PHILOLOGICAL ANALYSIS

The multispectral analysis of the Bologna fragment has permitted verification of some previous conjectures and readings of the Gothic text. Among the passages that have been reanalysed, there is line 15 on f. 1v. Finazzi and Tornaghi[25] deciphered the last word of this line as *liwane*, genitive plural of the—hitherto unattested—Gothic word for 'lion'. This word fits the context perfectly, since it is a passage from Daniel 6:22–27 (Daniel in the lions' den). The space between ϵ ‹e› of the previous word 'b[a]*l*jondane'[26] 'roaring' and the supposed ʌ ‹l› of *liwane* is, however, too wide (framed in Fig. 3) and, in my second edition of this fragment,[27] I proposed reading '*l*aiwane', thinking that what has been read as ʌ ‹l› is instead an ʌ ‹a› (the two letters are very similar) and that the letter ʌ ‹l› occupies the space between ϵ ‹e› and ʌ ‹a›. Traces of the letter ʌ ‹l› emerge now thanks to the false colour image, which shows that the conjecture "*l*aiwane" is indeed the form attested in the manuscript (see Fig. 3c and 3d).

The origin of the term for 'lion' is not clear. It is obviously a borrowing, which could theoretically derive from Lat. *leo*, *leonis* (a loanword in its turn[28]), Gr. λέων, λέοντος, or another unknown language. This animal was not indigenous in the territories where the Goths came from (Northern Europe) and settled (Dacia and Moesia Inferior), but it was probably known through the *venationes*, i.e. the entertainments typical of the Roman Empire that involved the hunting and killing of wild animals.[29] *Leones* '(the) lions' was also the name of Caracalla's bodyguards, recruited among Scythians (probably Goths) on the Danube border.[30] In such contexts, the Goths might have learned and spread the Latin term.

The term *laiwane* is a genitive plural of a weak masculine or neuter substantive (with the stem suffix *-an-*), as the ending suggests and the connected participle form 'b[a]*l*jondane' confirms. Before reconstructing the nominative form, it is necessary to examine the word from a graphic-phonetic point of view and in relationship with other loanwords. Goth. ‹ai› [e] usually renders Lat. *e* or Gr. ε in loanwords; Goth. ‹w› is instead problematic in this context. In diphthongs, ‹w› represents Lat. ‹u› (as in Goth. *kawtjo* < Lat. *cautio* 'caution') and Gr. ‹υ› [u] (as in Goth. *aiwlaugia* < Gr. εὐλογία 'blessing', 'benefaction'; Goth. *paraskaiwe* < Gr. παρασκευή 'day of preparation'). Its presence in *laiwane* is therefore difficult to explain in relation to Lat. *leo*, *leonis* or Gr. λέων, λέοντος.

The phonetic and morphological adaptation to the Gothic language suggests that the term is an old borrowing, perhaps from Latin, a language with which the Goths came into very early contact.[31] In fact, borrowings from Greek, which may be ascribed to Wulfila's time, usually retain a form close to the original, as in the case of Goth. *laigaion* 'legion' (< Gr. λεγεών vs. Lat. *legio*). On the basis of such considerations, the nominative form may be reconstructed as **laiwa* (masculine) or **laiwo* (neuter). **Laiwo* would be phonetically closer to the supposed donor form *leo*.[32] In the other Germanic languages, the form for 'lion' is masculine, but a hypothetical neuter in Gothic might be justified as independent borrowing. Different gender is attested, for instance, in Goth. *skaurpjo* 'scorpion', weak feminine, in comparison with Old High German *scorpio*, weak masculine, both from Lat. *scorpio*,[33] masculine. On the other hand, the masculine form **laiwa* is preferable because the neuter gender for an animate being—and particularly for the lion—seems to be anomalous.

Goth. **laiwa* (or, less likely, **laiwo*), as already noted, exhibits the problematic *-w-*. This Gothic word might stem from Vulgar Latin (?) **leuo*, with irregular insertion of the labiovelar glide after the front vowel.[34]

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[25] Finazzi and Tornaghi, *Gothica Bononiensia*, de la découverte, 42.

[26] Quotation marks indicate the forms given in the critical edition (Falluomini, Zum gotischen Fragment II, 287); within the quotations, the letters which are underlined are only partially visible; italics are used for conjectures; the letter between '[ ]' is lost due to material reasons.

[27] Falluomini, Zum gotischen Fragment II, 287–288.

[28] Ernout and Meillet, *Dictionnaire etymologique*, 626.

[29] On the distribution of lions in Antiquity, see Blažek, Hic erant leones, 66–68.

[30] See Strobel, Strategy and Army Structure, 279, with additional literature.

[31] See Corazza, Parole latine, *passim*.

[32] Loanwords are integrated in different manners: Gothic may maintain the phonetic form of the original word and change the gender (as in the case of *skaurpjo* 'scorpion', see below) or maintain the gender and change the phonetic form (see *aikklesjo* 'church', feminine < Lat. *ecclesia* or Gr. ἐκκλησία, feminine).

[33] Corazza, Parole latine, 77.

[34] It is not normal to have the glide *-w-* after a front vowel in Latin, but some examples are present in Latin texts from Britain (Adams,

However, a similar evolution is not attested in the Latin spoken in the regions of Dacia and Moesia Inferior.[35] There is a second, more likely hypothesis to explain the form **laiwa*: the insertion of the labiovelar glide in hiatus might be the result of an adaption of the borrowed form into the Gothic language.[36] Other Germanic languages show a similar insertion: Old High German *leuuo* (9th century) and Old Dutch *lewo* (10th century). In these cases, -*w*- has been explained as secondary addition, independent from the Latin form.[37] An analogous adaptation may also have occurred in Gothic.

Before the discovery of the Bologna fragment, some scholars[38] had suggested—on the basis of the Proto-Slavic form **lьvъ* 'lion'—the reconstruction of the Gothic form **liwa*,[39] from which the Proto-Slavic term would be derived. Goth. -**i*- was advocated on the basis of the Proto-Slavic vocal -**ь*-, which may not stem from a short -*e*- (Goth. ‹ai›) but only from a short -*i*- (Goth. ‹i›).[40] Thus, if the Proto-Slavic term really derives from a Gothic form, this is presumably different from that attested in the *Gothica Bononiensia*.[41]

To conclude, the application of sophisticated methodologies to the Gothic palimpsest from Bologna has allowed parts of the text that were previously illegible to be recovered. The philological investigation has brought a new word to light (**laiwa* or, less likely, **laiwo* 'lion'), which had never been attested before the discovery of this fragment. It is a borrowing, probably from Lat. *leo* 'lion'. Its phonetic and morphological adaptation suggests a long acquaintance of the Goths with the lion or—most probably—with its designation.

[C. Falluomini]

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Social Variation, 113–118) and earlier from Pompei (Väänänen, *Introduzione al latino*, 96).

35 Mihăescu, *Langue latine.* I wish to thank James Noel Adams ([†] Oxford University) and Giovanbattista Galdi (Ghent University) for their very kind and detailed reply to my questions about this phenomenon in Vulgar Latin forms of Dacia and Moesia Inferior.

36 Motivated by the front vowel [e] (‹ai›)? This hypothesis could also explain the Gothic form **alew* 'oil' (*alewa*- in compounds), which exhibits the problematic insertion of -*w*- after [e:] ‹e› (Pagliarulo, Etymology). A labiovelar glide in hiatus is also present with the suffix -(*w)isk* (as in *haiþiwisks* 'wild'), according to Krahe and Meid, *Germanische Sprachwissenschaft*, 196. On the other hand, Goth. *saijands* exhibits the insertion of -*j*- between ‹ai› and ‹a›. Or is the insertion of -*w*- motivated by a possible back vowel [o:] (‹o›)? In this case, the form **laiwo* vs. **laiwa* would be preferable. The Gothic examples of vowel insertion in hiatus are too few to draw a phonetic rule.

37 See Bremer, Ahd. *Leo*, 384–387 (see also EWA, 1218–1222); EWN, 196–197. Thanks are due to Vittoria Dolcetti Corazza (Turin University), Heiner Eichner (Vienna University), Sergio Neri (Basel University) and Roland Schuhmann (Sächsische Akademie der Wissenschaften zu Leipzig) for discussing the origin of this word with me. All possible errors are, of course, my responsibility alone.

38 Stender-Petersen, *Slavisch-germanische Lehnwortkunde*, 361–362; Blažek, Hic erant leones, 88; Pronk-Tiethoff, *Germanic Loanwords*, 136.

39 The element -**liwa*-, attested in the Gothic onomastic material, has nothing to do with the word for 'lion'. It derives from Germ. **leuƀa*- 'dear' (Francovich Onesti, *Nomi degli Ostrogoti*, 120).

40 Stender-Petersen, *Slavisch-germanische Lehnwortkunde*, 362. By contrast, Mallory and Adams (*Encyclopedia of Indo-European Culture*, 356) assume that the Germanic word originally stems from Slavic. There are, however, insufficient elements to support this hypothesis. On other etymologies of the Slavic word, see also Černych, *Istoriko-etimologičeskij slovar'*, I, 471.

41 It seems likely that **liwa* may be a late Gothic form, given the development of Goth. [e] ‹ai› in [i] ‹i›. This development is also found in some forms attested in Gothic manuscripts (as in 2 Cor 2:13, *Ambrosianus* A: *Makaidonja* against *Ambrosianus* B: *Makidonja* for Gr. Μακεδονία).

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Damianos Kasotakis

The Sinai Palimpsests Project: A View from the Imaging Room*

St. Catherine's Monastery is located in a remote area of the Sinai Peninsula, in a desert surrounded by granite mountains. At first glance, it appears an unfriendly place for humans to survive, but the history of the 1500-year-old Justinianic fortress tells us otherwise. In the monastery's library, we find treasures hidden from the outside world, which have survived alongside the monks for centuries. One of the main factors in the preservation of the objects is the natural environment of the location. Temperatures throughout the year range from 8° C to 30° C, but even under these harsh conditions no climatic damage is evident in the manuscripts, since the relative humidity, which drops to values of 10%–15%—very low from a conservation point of view—is very stable and causes only short-term fluctuations.[1] Among these treasures are the palimpsest manuscripts.

During the 19th and 20th centuries there were several attempts to make the erased texts legible by various means. For instance, Agnes Smith Lewis describes the 'cautious use of the re-agent' (hydro-sulphide of ammonia) to make the undertext of Sin. syr. 30 temporarily more visible to the human eye.[2] Also worth noting is the pioneering work of Arthur Hjelt, who attempted to photograph palimpsests by using an ultraviolet 'Wood's glass optical filter' under natural sunlight.[3] More recently, the Sinai Palimpsests Project (SPP) used non-invasive techniques for image capture: human interaction was limited to positioning the manuscript on sophisticated book cradles, imaging was performed in climate-controlled environments, and the use of dark rooms ensured that manuscripts did not have to be exposed to the natural elements and the sun. Prior to imaging, the Monastery's librarian, Father Justin Sinaites, determined whether each object was safe enough to handle, and determined the exact approach of handling the manuscripts. The Sinai Palimpsests Project represents the first time a palimpsest collection has been systematically digitally imaged with non-invasive techniques.[4]

The Sinai Palimpsests Project started in 2009 with a Pilot Imaging Project identifying technologies and ways to approach this very special collection. Once financial support by the Arcadia Fund was secured, the imaging project officially started capturing spectral data in 2011, and concluded spectral digitization in 2016 after five years of systematic work in the library of the Holy Monastery. This work was carried out with the support of the Sinai Fathers, the Librarian Father Justin Sinaites, and the Egyptian Government.[5]

At the beginning of Sinai Palimpsests Project, 110 palimpsest manuscripts had been identified as palimpsest but had not yet been catalogued or studied page by page.[6] Five years later, 160 palimpsest manuscripts were known and included in the Sinai Palimpsests Project database. At the time of writing, we are now aware of 172 manuscripts at St. Catherine's Monastery which are entirely or partially written on recycled parchment.[7] It is estimated that the number may well exceed 200 if the entire collection of the Monastery is examined page by page.[8] When the imaging project concluded in August 2016, 74 palimpsests had been imaged, amounting to a total of 6,800 pages spectrally imaged, resulting in more than 50 TB of data including the processed images.[9]

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1 Strebel, Passive Climate Control, 23; Koufopoulos and Myriantheos-Koufopoulou, *Master Plan*, 30.

2 Lewis, *Translation of the Four Gospels*, ix.

3 Hjelt, *Helsingistä Siinaille*, 118–123.

4 More on this in the contributions by Michael Phelps and Keith Knox in this volume.

5 Egyptian State Information Service, Iktishāf makhṭūṭ atharī li-Hībūqrāṭ fī Dayr Sānt Kātrīn [Discovery of an Ancient Manuscript of Hippocrates in the Monastery of Saint Catherine], https://web.archive.org/web/20220525080808/https://sis.gov.eg/Story/144001?lang=ar (accessed 01.07.2023).

6 Unpublished list compiled from existing catalogues by G. Foukaneli-Fyssa (2008), working under the direction of P. Nikolopoulos.

7 Last updated: 22.09.2020.

8 Father Justin Sinaites (2016): Personal communication.

9 All images can be found online at this address: http://sinaipalimpsests.org/ (accessed 01.07.2023, alternative URL: https://web.

WORKFLOW

Even before the spectral imaging of the manuscripts is carried out, data regarding the palimpsests is recorded by scholars, initially by cataloguing the manuscript page by page, and separating the erased texts into language groups.[10] During this process, features of the folio are recorded such as: flesh or hair side, the colour of the ink, the attributes of the script (for example if it is a Greek majuscule or minuscule), as well as other observations that may be useful during the imaging or image processing of the folios. For example, knowing that a page is a flesh side is important for the image processing team to know, since that tells them whether good results can be extracted by using transmissive illumination images.

On the basis of this information, an entry is created in the KatIkon digital tool.[11] This allows us to create a Shoot List that acts as a guidance tool for the imaging team.[12] This Shoot List includes not just the order of folios that are to be imaged, but all the necessary metadata for each manuscript side, so that this information can be embedded during the imaging sequence while the image files are created. The MegaVision capturing software PhotoShoot allows the import of metadata in .txt (Text) format for individual sequence of images.

The process of digital imaging is the first and fundamental step in retrieving texts that are not easily readable by the naked eye. It lays the foundation for the subsequent image processing of palimpsest texts. It is here that we create the digital material that we call raw images. Raw images are digital files that have not been processed; they are uncompressed, unpacked, 100 megabytes each, in *.DNG format, and hold a dynamic range of 12 bits per channel.

The optical unit of the imaging system is a custom designed 120mm apochromatic lens made of quartz crystals. Typical lenses made of glass will allow longwave UV to pass, but absorb all the other UV wavelengths. The 120mm quartz apochromatic lens is corrected in three wavelengths (UV-IR-VIS) to minimize the magnification and focus changes between the UV-IR and VIS spectrum. Without this lens, one would encounter the common problem of misregistration of data between fluorescent and reflectance shots and the need to refocus between IR and UV. The lens is custom-built with multispectral applications in mind and uses a central, Copal 0, Schneider electronic leaf shutter. The lens design utilizes nine elements in seven groups. Six of them are special low dispersion (ED) glass, and the rear element is aspheric. The use of the specific lens is unique to the system developed by MegaVision and used by the Sinai Palimpsests Project.

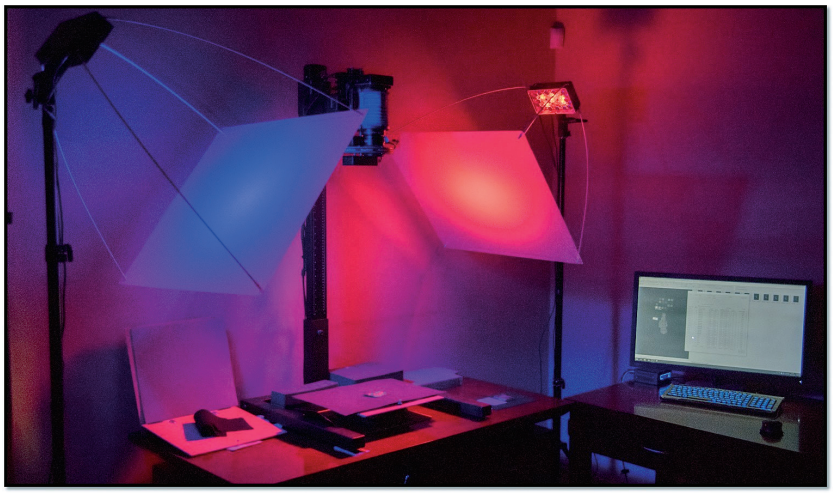

Fig. 1: Current E7 MegaVision Spectral Imaging System, a product of the Archimedes Palimpsest Project, updated by the Sinai Palimpsests Project to its current form. The following components are visible: LED light sources, diffusers creating even distribution of light, E7 digital back, filter wheel, 120mm apochromatic lens, and capture computer controlling all of the above.
(© Damianos Kasotakis & MegaVision)

archive.org/web/20220315215735/http://sinaipalimpsests.org/).

[10] This work was the task of the Scholarly Director of the Project, Claudia Rapp, supported by Giulia Rossetto from October 2014.

[11] Emery and Rapp, KatIkon: A Digital Catalogue as Multi-Purpose Tool.

[12] A Shoot List is defined as a collection of individual .txt files, each representing a folio side of a specific manuscript to be imaged. This is automatically generated by KatIkon upon call of a specific function of the database, simplified to a press of a button named 'Download Shoot List' by the end user.

During spectral photography at St. Catherine's, Sinai, 33 different black-and-white images were recorded for each manuscript side, using a 50-megapixel camera manufactured by MegaVision Inc. that houses a Kodak CCD Imaging Sensor (KAF-50100) with 8176(H) × 6132 (V) pixels. A CCD array sensor gives an advantage over a CMOS censor when capturing spectral images by having a better spectral response in the 350–1100 nm range.

The MegaVision E7 Kodak sensor is a monochrome sensor, meaning that it does not have a Bayer filter. A Bayer filter, common in all modern digital cameras, uses pixel-level Red-Green-Blue filters and results in great losses both in the recording of the remaining wavelengths (colours) and in the light intensity (in brightness).[13] Removing those filters from the sensor, we can use less energy to capture better data, meaning a better noise to signal ratio, as well as less exposure of the manuscript's surface to artificially-generated energy from the LED light sources. By recording information in the gray-scale, light intensity is captured for each specific wavelength with which the object is illuminated. As a result, we obtain a better resolution, and we are truly using all of the 50.000.000 pixels of our E7 digital back. This high resolution gives us the opportunity to study very closely, one by one, the elements of the text we are trying to identify. Such high-resolution images are important, in order to provide the scholars with the greatest possible amount of detail to identify individual letters or even parts of letters.

Each manuscript recto and verso side is captured by a sequence of 33 shots. Each time, the manuscript is illuminated by a different wavelength of light (colour) and in some cases also with light coming at different angles: two raking lights at 15 degrees, two main lights at 45 degrees, and one transmissive light source that is placed under the folio to capture erasures. The idea of implementing transmissive illumination is not new to the world of photography, but this was the first time that this technology had been integrated into a large-scale project along with spectral imaging for the photography of palimpsested manuscripts. More specifically, the lights that were used for imaging the Sinai palimpsest manuscripts had 12 different wavelengths. Since then, modern MegaVision systems have begun to use up to 16 or 20 different wavelengths. This is partly in response to the Sinai Palimpsests Project demanding more and more data to be recorded for future analysis. This high density of information gathered in the course of the imaging is a hallmark for the work of EMEL and its associates, who are leading developments and contributions in the field of Spectral Imaging.[14] In the process of EMEL's work with the Sinai Palimpsests Project, on-site solutions were developed and are now driving the technology from which the rest of the world is benefiting.

Using LED technology avoids the production of heat on the surface of the manuscript and thus allows us to honour our responsibility to perform noninvasive and non-destructive examinations. The wavelengths utilized range from ultraviolet 365 nm to infrared 940 nm, including wavelengths visible to the human eye with the use of seven distinctive LED lights ranging from 400 nm to 700 nm. The LED light sources originally designed by William Christens-Barry[15] received two upgrades during the Sinai Palimpsests Project, by Ken Boydston.[16] In their original design, lights were recognized by the capturing computer as Serial Devices. As a result, they often conflicted with the Operating System and the capturing software, leading to random disconnections from the system. In 2013, the lights were updated with new control boards, allowing them to interact with the capturing system as USB devices, thus providing better connection stability as well as higher power output which in turn leads to shorter exposure times. The third and final update of the lighting system was the addition of two auxiliary light sources housing UV wavelengths at 365 nm and 385 nm that provided even shorter exposure times as well as more data in the UV and near UV spectrum.

There are four different imaging principles in the system: reflectance, transmissive, raking, and fluorescence. In reflectance, light hits the surface of the object from a 45-degree angle and gets reflected to the imaging sensor that is parallel to the object. In transmissive, light penetrates the object and exits from the other side if the object is thin enough. In raking, light illuminates the object from a low angle of 15-degree, creating shadows and highlighting the curvature of the object. In fluorescence, parchment absorbs the short UV wave-

[13] Patent US3971065—Colour imaging array.

[14] EMEL: Early Manuscripts Electronic Library, URL: http://emel-library.org/ (accessed 01.07.2023, alternative URL: https://web.archive.org/web/20220412092445/http://emel-library.org/).

[15] Equipoise Imaging, LLC (Baltimore, MD, USA).

[16] MegaVision (Santa Barbara, CA, USA), URL: http://www.mega-vision.com/ (accessed 01.07.2023, alternative URL: https://web.archive.org/web/20220517101938/https://www.mega-vision.com/).

lengths and re-emits them back at longer wavelengths, which are visible to the eye and can be captured by a digital sensor. This makes the object a broad-band light source and for these specific shots filters can be applied in front of the lens to capture selectively narrower bands. Areas of the parchment that have erased ink on them react differently in their fluorescence from the parchment. This difference is essential in recovering erased writing and is captured in the images. While processing the spectral data these small differences will allow the two-dimensional captured images to be differentiated into separate groups: parchment with no ink, parchment with erased ink, and parchment with more recent ink.

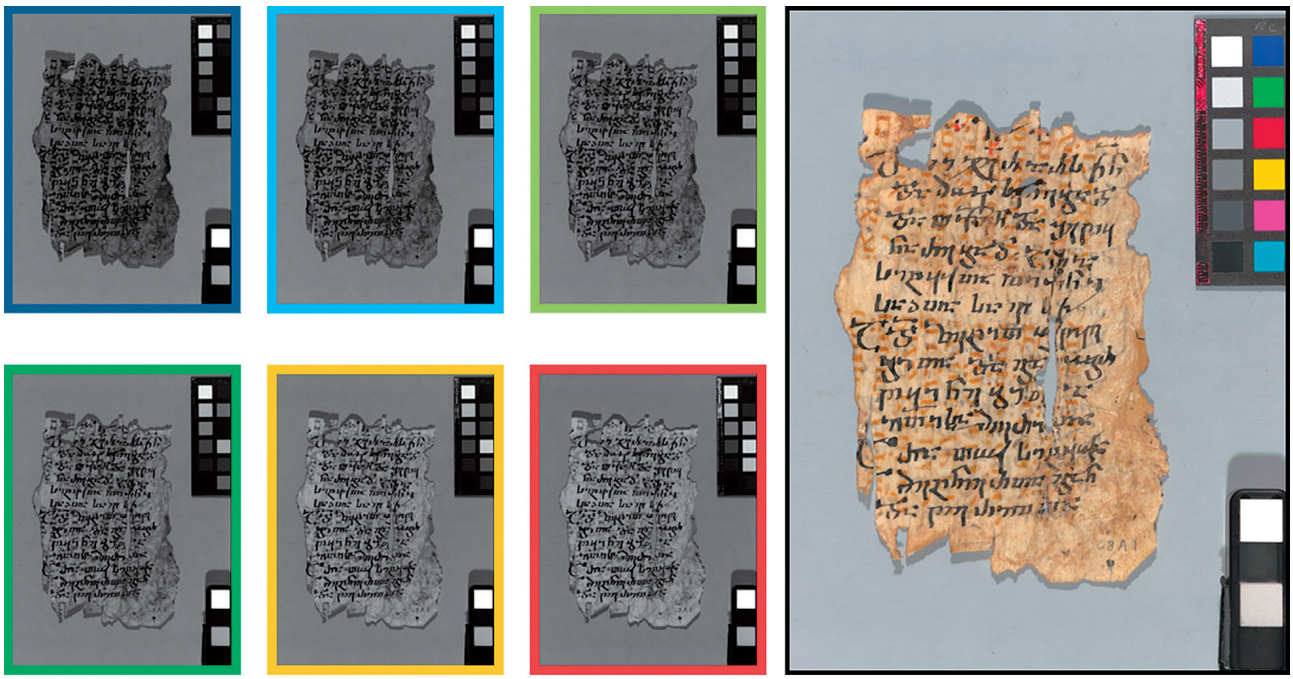

Fig. 2: Colour image produced by a combination of visible wavelengths. Seven visible wavelengths are used to produce the colour image. In this example only six images are visible for reasons of space
(© St. Catherine's Monastery, Sinai, Egypt)

Multiple individual visible wavelengths of light, when combined, produce a very accurate representation of the actual colour of the object. Where Bayer-filter digital cameras use only three colours (RGB) to produce a colour image, the Spectral Imaging System uses seven colours (Fig. 2) (Royal Blue, Light Blue, Cyan, Green, Amber, Red, and Dark Red), and more recent ones use up to 12 visible wavelengths. This is achieved by a combination of seven different gray-scale pictures captured under the conditions of a dark room with the only illumination coming from those specific wavelengths, configured manually according to L*a*b* readings of the digital pictures, and white balanced according to L*a*b* measurements from colour targets (more specifically: the MacBeth colour target).[17] Calibration of all images can be traced back by using unique serial codes of the colour targets which are manufactured under specific standards, so that an accurate reproduction of the results can be achieved at any given time.[18] The MegaVision digital camera back E7 and MegaVision Photoshoot capture software are linked in such a way that new calibration files can be captured, if needed. These can then be compared to older calibrations in tables of numbers for each individual colour patch, since what we have as a system is essentially a high-resolution colorimeter.

[17] GretagMacbeth GmbH became X-Rite GmbH in September 2012 but the team is still the same. URL: https://web.archive.org/web/20220328070852/http:/gretagmacbeth.de/ (accessed 01.07.2023).

[18] Colorimetric measurements using the CIE 1931 2° standard observer and Illuminant C, and also in terms of the Munsell colour system. Using measured reflectance spectra, it is possible to derive CIELAB coordinates for Illuminants D65 and D50 and coordinates in sRGB.

In cases of folios where the ink has eroded the parchment surface, or—as we used to say during the Project—where 'the ink has eaten into the parchment', a specially built surface—the transmissive light source—is used to illuminate the folio from below so that the light penetrates more easily in the area of the letters where the parchment has become thinner. Two transmissive light sources were designed specifically for the Sinai Palimpsests Project: a device that can be inserted between folios with an edge that progressively becomes thinner so that light can illuminate the folio all the way to the gutter, and a second device that resembles a photo box platform upon which unbound or fragmentary objects can be placed for imaging from a 90-degree angle in a copystand setup. The experience of the Sinai Palimpsests Project has shown that the use of spectral transmissive light sources yields significantly better results if the original text was written on the flesh side. The transmissive light source used in Sinai was built by William Christens-Barry and featured four visible wavelengths and four IR wavelengths, though only the longest IR wavelength (940 nm) has proven to be consistently useful in processing. For this reason, recent transmissive light sources by MegaVision reduce the number of wavelengths.

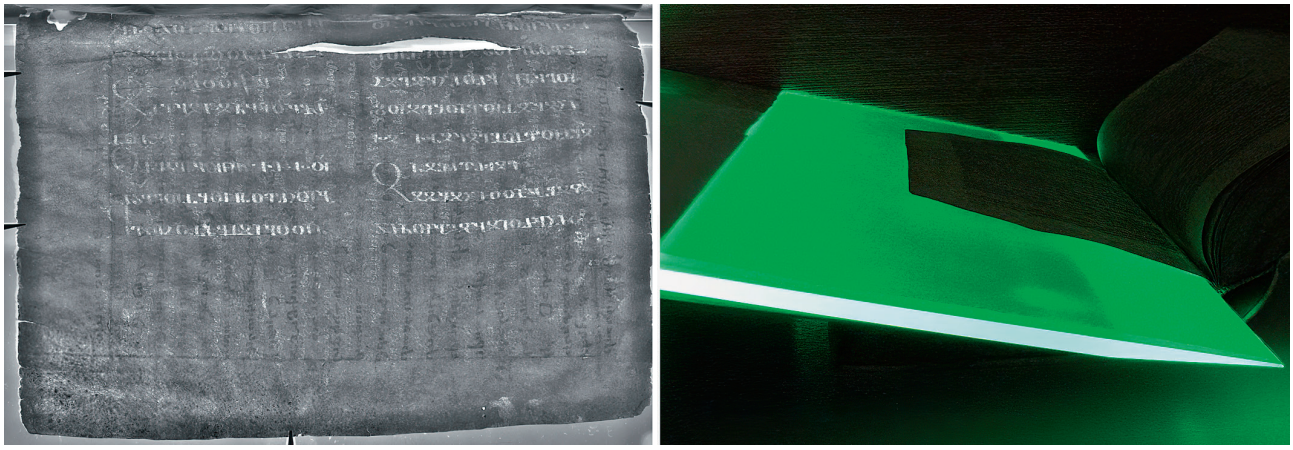

Fig. 3: Light illuminating through parts of parchment that have been eroded by the ink. Transmissive light source inserted close to the gutter of the folio. Designed and used for the Sinai Palimpsests Project
(© St. Catherine's Monastery, Sinai, Egypt / Early Manuscripts Electronic Library)

The digitization process was made possible using equipment that already existed at St. Catherine's, as well as equipment that was specifically designed for this project. One part of the pre-existing equipment was the manuscript support mechanism for the digitization of fragile manuscript codices, the Preservation Book Cradle by Stokes Imaging.[19] The Stokes Cradle is a support mechanism (book cradle) that is considered to be one of the best options for supporting fragile codices and ideal for the collection of St. Catherine's. This mechanism allows for the natural movement of the spine of the manuscript codices without exerting pressure. Fragile codices are not harmed during digitization or put under any stress, since the book cradle can support books that open even at a ~90 degree angle.

The actual process of spectral digital imaging is lengthy in terms of time. In the Sinai Palimpsests Project it took up to ten minutes per side to capture the necessary data. Of these ten minutes, six were required for imaging, and one to four for material handling. For the imaging, exposure times ranged from a little less than a second up to 30 seconds. Visible spectrum and infrared sequences needed short exposures, but the lower range wavelengths of violet and ultra-violet needed longer exposures. In sequences that required the use of filters, longer exposures were used to compensate for the loss of illumination as light was passing through the filters. As anticipated, material handling took up to four minutes, since the priority during the imaging was the safety of the fragile manuscript objects. It took great effort to securely position a single page in such a way that the object would not move at all for the duration of the imaging sequence. Any movement would lead to

[19] Stokes Imaging (Austin, TX, USA), URL: http://www.stokesimaging.com/pbc.html (accessed 01.07.2023, alternative URL: https://web.archive.org/web/20220217072724/http://www.stokesimaging.com/pbc.html).

misregistration of the data, or blurry images in the longer exposures. The imaging of Sin. ar. NF 8 (*Diktyon* 58318) can serve as an example of the time needed for the imaging of a single manuscript. 256 sides, i.e. rectos and versos, were captured from the manuscript. For each side it took 6 minutes of imaging and another 2 minutes of material handling to switch between folios. In total, 2,048 minutes, or approximately 34 hours, were needed to complete the imaging of the manuscript. This amounts to about a week for the imaging, not counting the frequent electricity outages.

The subsequent task of image processing was also time consuming, as it could take less than one minute per page in the case of batch processing, but up to 180 minutes or more per page for manual statistical image processing. The end result of this lengthy process, which began with 33 different black-and-white photographs, is one or two final pictures in which the erased writing becomes as legible as possible.

A VIEW FROM THE WORKROOM

A personal experience from the library during our work resulted in an unexpected discovery while imaging the manuscript Sin. ar. NF 8. In the captured images some strange shapes were barely discernible behind the Arabic overtext instead of the usual letters. These shapes at first seemed like flowers. It is worth noting that when imaging a codex, the order that was followed was imaging all the recto sides first, and then all the verso sides, so there was no possibility at this stage of seeing the pages as a continuation of each other. After the completion of one side of the codex, and while imaging the facing side, I again observed further strange shapes under the Arabic overtext, this time in even more distinct form. The answer came a few weeks later[20] when Roger Easton processed the images, and I was able to read the name of the plant called 'phileterion' (φιλετέριον in the manuscript; corr. φιλεταίριον) and the text in Greek in the lower left of the new image, describing how the leaves of the plant could be boiled in oil to be used as a healing paste against scorpion bites. Initial quick research showed that 'phileterion' was mentioned as 'polemonium' by the ancient medical author Dioscurides. Polemonium is still the Latin name of this plant.[21] A further check by Giulia Rossetto, participating scholar in the Sinai Palimpsests Project, confirmed that the exact text was not found in the existing corpus of Greek texts of the *Thesaurus Linguae Graecae* (*TLG*).[22] Subsequent study of this ancient illustration and the accompanying text by participating scholars Agamemnon Tselikas and Nigel Wilson has revealed that the illustrated folio was written in a loose majuscule of small size from the 5th–6th century, and could originate from a herbal earlier than that of Dioscorides, possibly by the physician Crateuas.[23]

This discovery conveys the excitement of being the first, in the imaging room, to recognize unusual features in the erased layers that are being made visible thanks to a long chain made up of interconnected links. It is a chain that connects us, as we work with the most up-to-date technology of the 21st century, with the monks who wrote, used, and owned these manuscripts across the centuries.

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[20] May 29, 2014.

[21] Adams, *The Seven Books of Paulus Aegineta*, 304: 'Πολεμώνιων, Polemonium, Greek Valerian (called by some Philetaerium), is attenuate and desiccative. Hence some give the root of it in wine for ischiatic disease, dysentery, and scirrhus of the spleen. […] It occurs in the Hippocratic treatises (Hippiatr. 108, ed. Basil) but is not found in the works of Celsus. Dioscorides recommends it to be given for the bites of venomous reptiles, for dysentery, dysuria, sciatica, and diseases of the spleen, and also as a masticatory for toothache. He further mentions that it was used as an amulet for the sting of the scorpion (IV, 8). Our author copies from Galen, as does also Aetius. We have not been able to trace it in the works for the Arabians, with the exception of Ebn Baithar, whose account of it is made up entirely of extracts from Dioscorides and Galen (I, 186).'

[22] Rossetto, Giulia (2015): personal communication.

[23] See more on this text in Giulia Rossetto's contribution in this volume.

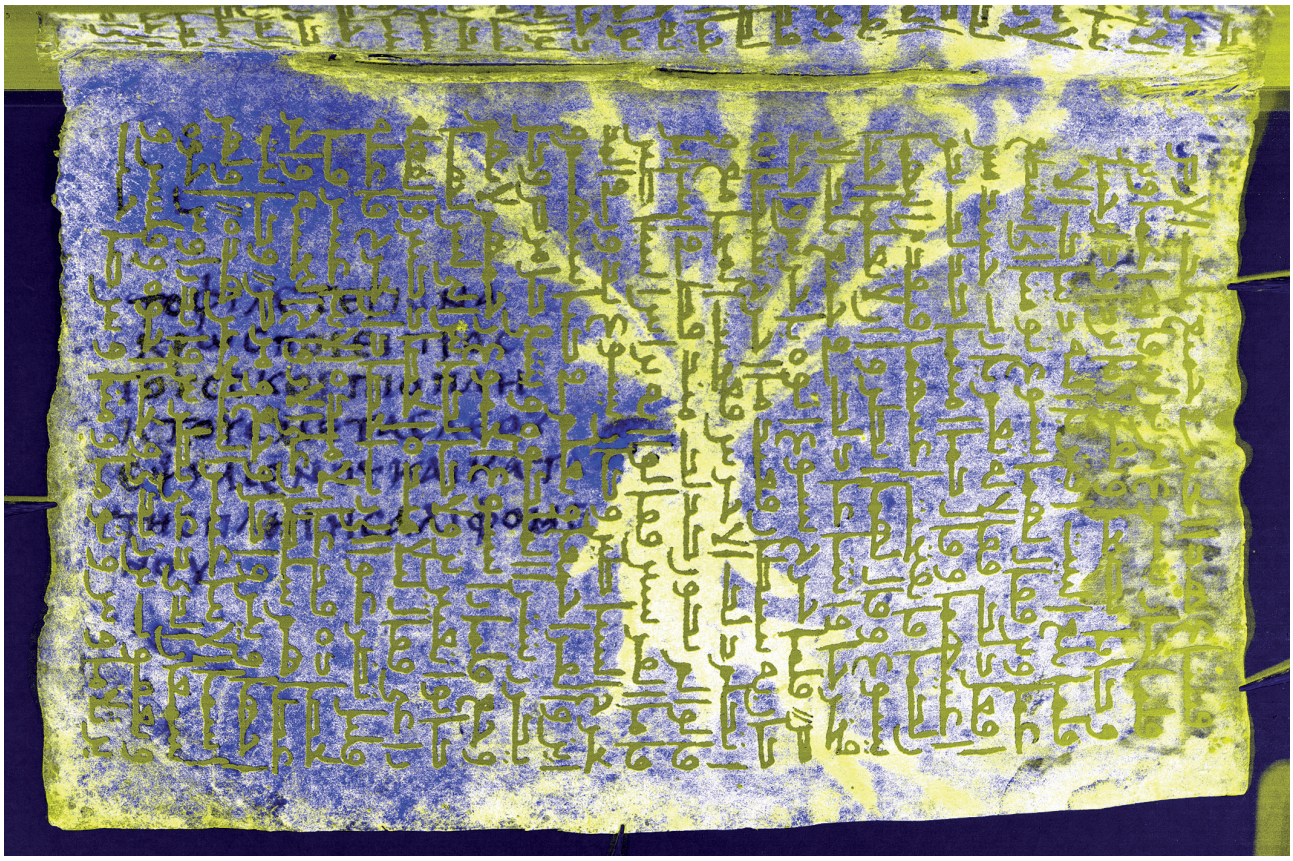

Fig. 4: RAW image of Sin. ar. NF 8, f. 16v under UV illumination: two folios stitched together and rotated through 90° reveal the ‘phileterion’
(© St. Catherine’s Monastery, Sinai, Egypt)

ΤΟΦΙΛΕΤΕΡΙΟΝΑ ΚΡΩΣΠΟΙΕΙΠΡΟΣ ΤΟΥΣΣΚΟΡΠΙΟΠΛΗ ΚΤΟΥΣΜΕΤΑΕΛΕΟΥ ΕΨΥΜΕΝΟΥΚΑΙΚΑΤΑ ΥΤΗΣΠΛΗΓΗΣΑΛΙΦΟΜΕ ΝΟΥ	ΤΟ ΦΙΛΕΤΕΡΙΟΝ ΑΚΡΩΣ ΠΟΙΕΙ ΠΡΟΣ ΤΟΥΣ ΣΚΟΡΠΙΟΠΛΗΚΤΟΥΣ ΜΕΤΑ ΕΛΕΟΥ ΕΨΥΜΕΝΟΥ ΚΑΙ ΚΑΤ ΑΥΤΗΣ ΠΛΗΓΗΣ ΑΛΙΦΟΜΕΝΟΥ[24]	The phileterion acts/works perfectly for those who are stung by a scorpion after having boiled some oil, and having used it to anoint the wound.

[24] Τὸ φιλεταίριον (φιλετεριον cod.) ἄκρως ποιεῖ πρὸς τοὺς σκορπιοπλήκτους μετὰ ἐλέου ἐψυμένου καὶ κατ’ αὐτῆς <τῆς> πληγῆς ἀλιφομένου.

Fig. 5: Phileterion, an ancient illustration of a medicinal plant.
The image of Sin. ar. NF 8 (ff. 16v+17r) processed by Roger Easton Jr. reveals a pharmaceutical recipe
(© St. Catherine's Monastery, Sinai, Egypt)

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Keith T. Knox

Image Processing Methods that Reveal Erased Handwriting: Developments of the Last Two Decades*

INTRODUCTION

In the past, manuscripts that were no longer of interest to their owners were erased and overwritten. The erased writings of these manuscripts, i.e. the palimpsests, are often hundreds of years older than the visible overwriting on the manuscripts and may represent works that otherwise do not exist. The erased writing becomes slightly visible with age, but is still difficult for scholars to read. In the 19th century, it was determined that applying some chemical elements of the ink that had been removed back onto the page could enhance the writing. A number of reagents were developed to enhance the erased text. Unfortunately, over the following years, these added reagents darkened and made the erased text less visible to later scholars. Eventually, this practice was discontinued.

In the early 1900s, scholars were learning that various optical filters could help improve visibility. One scholar, Father Raphael Kögel, discovered that ultraviolet light enhances the visibility of the erased writing.[1] Under ultraviolet illumination, the parchment would fluoresce, i.e. emit visible light, but the residual ink stains in the erased writing would inhibit that fluorescence, making the erased text darker in comparison to its surroundings and therefore more visible. Since that ground-breaking discovery, several more technological advances have been developed that have increased the options available to reveal the erased writing.

Advances in remote sensing, i.e. the study of the earth from satellites in earth orbit, have provided several tools for analyzing satellite multispectral image data. Multispectral images are the same as everyday images, except that each image is made with the light from a very narrow spectral region, i.e., each image is made from a single colour. X-ray fluorescence (XRF) also has revealed erased writing, especially writing that is covered by optically opaque material.[2] XRF is used today to identify individual elements of a material. An XRF image of the locations of concentrations of iron or calcium can reveal erased inks where traces of those materials from the ink remain in the parchment.

In this paper, recent optical methods and software algorithms will be described that have been developed to reveal erased writing. The optical methods were developed by the EMEL (Early Manuscripts Electronic Library) team, and the software algorithms were developed by the author. The optical imaging equipment is available commercially, while the software described here is freely available at http://r-chive.com/software.

MULTISPECTRAL IMAGING

Light interacts with the parchment, and the inks on it, in four distinct ways—reflectance, transmission, fluorescence, and angle-of-incidence.

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* The author wishes to acknowledge the contributions to this work from a team of scientists and scholars. Over the last decade, these efforts have been organized by Michael Phelps, the director of the Early Manuscripts Electronic Library (EMEL). At various times, the team has included Ken Boydston from MegaVision, Damianos Kasotakis from EMEL, Ivan Shevchuk from University of Hamburg, and Roger Easton, Jr. from Rochester Institute of Technology. In particular, over many years, Roger Easton, Jr. has contributed many helpful suggestions as these algorithms were being developed. Early efforts at text recovery were supported by William Noel from University of Pennsylvania, originally from the Walters Art Museum, and funded by the anonymous Owner of the Archimedes Palimpsest. The efforts on the Sinai Palimpsests Project were funded by the Arcadia Fund. The efforts on the Petermann manuscript were funded by the German Research Foundation (DFG) [project no. STU 469/1-1].

[1] Kögel, Die Palimpsestphotographie, and Kögel, *Die Palimpsestphotographie*.

[2] Bergmann and Knox, Pseudo-color enhanced x-ray fluorescence imaging.

What is light? By some definitions, light is electromagnetic radiation that we can see with our eyes. This is also called visible light. The electromagnetic spectrum just beyond the visible region is called ultraviolet, for radiation with a shorter wavelength than blue light, the shortest wavelength of the visible region. It is called infrared for wavelengths longer than red light, the longest visible wavelength. Your eyes cannot see the ultraviolet, or the infrared illumination, but the sensor in the camera can. The parchment and inks also interact with these wavelengths, so these are important regions of the spectrum, even though, to your eye, nothing appears to be happening when the manuscript is illuminated by invisible light.

Reflectance is the most common way that we think of light interacting with a surface. Light is incident on the surface and it is reflected off the surface towards the observer, i.e. either a person or a camera. The colour of the light that is reflected depends on the material. If the material appears to you to be 'red', it is because the red light incident on the surface is reflected. All other wavelengths are absorbed. For example, green and blue light that is incident on a 'red' surface would be absorbed in the material and would not be seen. It is reflectance that gives rise to what we think of as the 'colour' of the material. Reflectance images can be used to distinguish between materials of different colours.

The light that does not reflect from the surface will enter the parchment. Some of the light will be absorbed by the parchment. In addition, some will be scattered around within the parchment. Some of the scattered light will make its way back to the front surface and be emitted from the parchment close to where it entered. Other scattered light will make its way through the parchment and come out of the back surface of the parchment. This latter light is called transmitted light, or transmittance.

To be transmitted through the parchment, the light has to avoid being absorbed or being scattered too many times. Shorter wavelengths, ultraviolet and blue light, are scattered a lot, so these wavelengths end up transmitting very little light. Most of it is scattered and absorbed. The longer wavelengths are scattered less and are the main component of the transmittance. As a result, infrared light is best for capturing transmission images.

Transmitted light is very good for detecting small differences in thickness of the parchment. Any differences in thickness of the parchment will show up as variations of brightness in the transmission images. Thinner regions of the parchment will scatter the light less, allowing more light to be transmitted in that region. This turns out to be very helpful in detecting characters that have eroded the parchment, leaving small cavities in the parchment that take the shape of the missing characters.

Fluorescence is a completely different process. For reflectance, if the parchment is illuminated with light of a specific wavelength, the reflected light consists of light of that exact wavelength. Similarly, with transmittance, the transmitted light is the same wavelength as the incident light. This is not true of fluorescence. Fluorescence is most useful in enhancing stains left in the parchment from erased iron gall ink.

Fluorescence is the process of light being absorbed by the material and then re-emitted at a different, i.e. a longer, wavelength. The shorter the wavelength of the light, the more energy it contains. When a short wavelength is absorbed, it can dislodge an electron in an atom. This electron hole needs to be refilled, and an electron from a higher orbit in the atom takes its place. In jumping to a lower orbit, this second electron gives up energy by releasing a photon of light. Some energy is lost in this process, so the energy of the emitted photon is less than the original incident photon, and therefore the wavelength is longer.

For fluorescence to occur, the incident light has to have enough energy to dislodge an electron. This requires very short wavelengths, either ultraviolet or very blue light. Other wavelengths of light, green through infrared, do not have the energy to cause fluorescence. The re-emitted light, the fluorescence, is at a longer wavelength. Most often this is blue light, but sometimes it can be green, red, or even, in rare cases, infrared light. In any case, for all cases of fluorescence, the light that comes back to the camera (the fluorescence) is not the same wavelength as the incident light.

As a result, when the parchment is illuminated with ultraviolet light, some ultraviolet light is reflected to the camera, and some fluorescence, likely some form of visible light, is also emitted in the direction of the camera. The image of the parchment, therefore, has both reflectance and fluorescence light in the image. To separate out the two responses of the parchment to the ultraviolet light, filters are placed in front of the camera to filter out one light or the other, so that all of the light can be seen individually. For example, a filter that only passes ultraviolet light would make an image of only the reflected ultraviolet light. A filter that passes only blue light would image the blue fluorescence. A filter that passes only green light would image the green fluorescence, etc. As a consequence, fluorescence images require filters to capture images at specific wavelengths. All other

image types—reflectance, transmission, and angle-of-incidence—do not require filters, because in those cases illuminating with light of a single colour produces images of the same, single colour.

The angle of the reflected light depends on the surface structure. A 'diffuse' surface is one that scatters the reflected light in all directions. As a result, a diffuse surface can be seen no matter what the angle of incidence of the illumination. A 'specular' surface is a very smooth surface. The angle of the reflected light, for a specular surface, depends heavily on the angle of the incident light, in relationship to the direction of the surface itself. An example of a specular reflection is a 'glint'—that is, a small, bright, and direct reflection of the source of light in the direction of the observer. Move the observer or the light source by a small amount, and the glint will either move slightly or disappear.

The last type of optical image that we take is called a 'raking' image. It is called this because the illumination is incident on the parchment at a raking angle, i.e. a very shallow angle with respect to the surface. The light source is located a short distance above the surface, about ten or twenty degrees above the plane of the surface. At this angle, the light casts shadows on the surface due to the bumps and irregularities of the surface. These images allow the scholar to see not only irregularities of the surface, but also indentations, such as rulings and pinpricks. These images can help analyze how the manuscript was constructed.

IMAGING SYSTEM

To capture multispectral images of a manuscript, our team uses the commercially available EV™ imaging system[3] from MegaVision,[4] shown in Figure 1. The system consists of a high-resolution 50 megapixel, panchromatic camera, with panels of LED lights of different individual colours, diffusers for uniform illumination, a light sheet for transmission imaging, and LED strips for shallow-angle (raking) illumination.

The panchromatic camera will record light with a range of wavelengths from 365 nm (ultraviolet), through the visible region (400–700 nm), and into the infrared (700–1050 nm). There are no filters on the camera sensor, so whatever light that falls on it in its sensitivity range (365–1050 nm) will be recorded in the output image. It is the responsibility of the camera operator to see that only the desired wavelengths of light are entering the camera during the exposure.

Fig. 1: The EV™ MegaVision Cultural Heritage Imaging System in use at the Staatsbibliothek zu Berlin. Dale Stewart adjusts the manuscript, while Ivan Shevchuk operates the camera. The LED panels illuminate the manuscript with one colour at a time in a series of several exposures under control of the computer (© Keith Knox)

[3] Christens-Barry *et al*., Camera System for multispectral imaging, 2–5.

[4] https://mega-vision.com/ (accessed 01.07.2023).

As described earlier, for reflection, transmission, and raking images, the wavelength of the incident light is the wavelength of the response. For fluorescence imaging, filters in front of the camera, in a filter wheel, are used to choose the specific wavelengths of the fluorescence to be studied.

The parchment leaf to be imaged is placed on the light sheet ('transmissive light source'). This is a translucent piece of plastic, in which light from three wavelengths, 580 nm (yellow), 735 nm (infrared), and 940 nm (infrared), is fed into the edges of the sheet. The light transmits through the sheet and radiates out of the sheet under the leaf, sending light upward, through the leaf and towards the camera above. Because these are longer wavelengths, the light easily transmits through the leaf.

The strips of raking lights, seen in Figure 1, contain two wavelengths, 450 nm (blue), and 940 nm (infrared). Since iron gall ink tends to fade away in infrared light,[5] the two wavelengths illuminate the topography with one type of light that exhibits legible writing, and another type of light that suppresses legible writing.

IMAGE PROCESSING

The process of manipulating digital images to enhance the desired details and to suppress the undesired details is called image processing. This is possible only if the information is present in the captured image data. Often the desired information is present, but it is in brightness regions that are not visible to the human eye. The goal of image processing is to find the desired information and to move it into brightness regions that the eye can see.

An image is a structured pattern of light, consisting of bright and dark regions, so that when they fall on the retina of the eye, the brain can interpret the original structure. A digital image is related to the original image, but is something different. A digital image is created when that same structured light pattern falls upon the camera's digital sensor. This sensor consists of a rectangular array of small detectors, called pixels (for 'picture elements'). Each detector element is sensitive to the light falling upon it. As the light is absorbed by the detector element, a charge builds up that is proportional to the amount of light falling upon it. The more light it sees, the more charge is stored in that detector element. This charge then passes through an analog-to-digital converter that converts the amount of charge to an integer number. The larger the number, the more charge was stored, and the more light fell upon that detector element. These numbers are read out of the camera and stored in a file in the computer in the same arrangement as the detector elements in the camera sensor. This array of numbers represents the amount of light that was seen by the camera sensor in the original image.

What can you do with a digital image? It is just an array of numbers. You cannot see an array of numbers as anything meaningful. To see the image that the digital array represents, you have to convert that array of numbers into an array of bright and dark areas on a display or a printer. To do that, you take the array and create a display with the amount of light displayed to be proportional to the numbers in the array. When you look at the newly-created image on a computer display, you now see the original image that was captured by the camera.

Here is where image processing enters. If you manipulate the numbers in the digital image to make some details brighter and other details darker, you can emphasize some features over others in the output display of the processed image. The method of identifying the desired features and making them more visible to the eye is what is called an image processing software algorithm. After those features are emphasized in the digital image, they can then be viewed by converting the digital image into an image on your computer display.

Fortunately, there are many available software programs to display or view a digital image on a computer display, so those programs do not need to be created. To make image processing algorithms and software to process the multispectral data of a manuscript leaf, all that is needed is 1) an understanding of how the image was captured, i.e. what the digital numbers represent in terms of the original images, and 2) a knowledge of how to identify, extract, and make visible the desired features in the original images. That is the subject of the rest of this paper.

STAINS FROM ERASED IRON GALL INK

Iron gall ink is made using tannic acid. The resultant tannin compounds in the ink soak into the parchment. When the particulates of the iron gall ink are removed by erasing the ink, the stains from the tannins remain

[5] Rabin *et al.*, Identification and classification.

in the parchment. These stains darken with time, making them more visible, but still hard to read. Under ultraviolet illumination, the parchment fluoresces in the visible region, i.e. in blue, green, or red light, making the parchment very bright. On the other hand, the tannins in the parchment inhibit the fluorescence in the parchment.[6] As a result, located next to the fluorescing parchment, the erased characters appear darker under ultraviolet illumination.

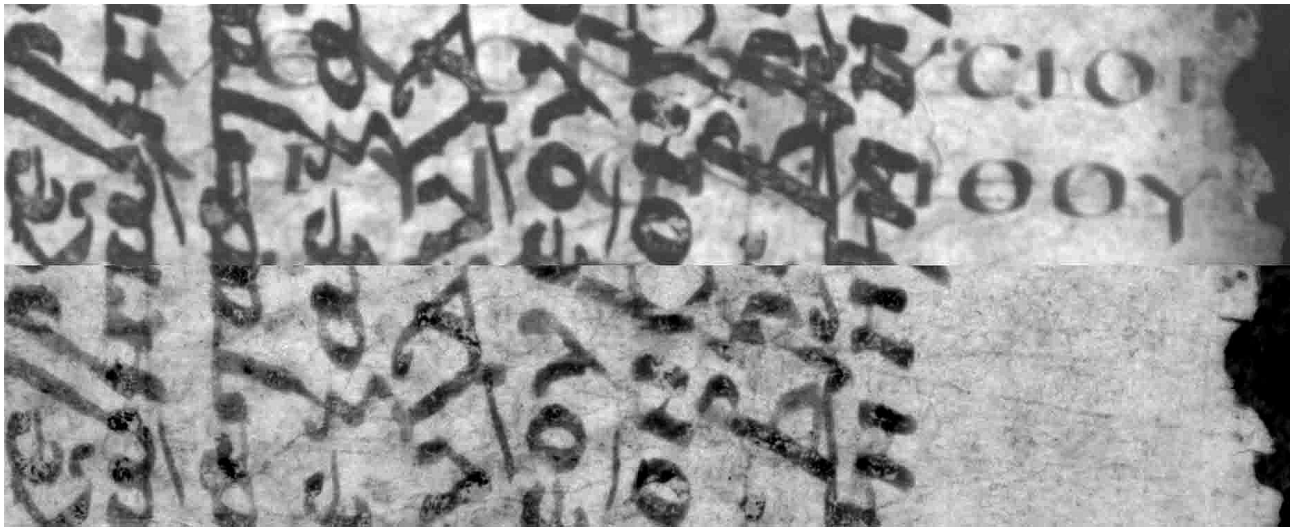

Fig. 2: Two images made with 365 nm ultraviolet light (top image), and 940 nm infrared light (bottom image). Note that the erased writing (horizontal) is legible in ultraviolet illumination and disappears in the infrared. This is a segment of the manuscript Sin. gr. NF MG 99 (© St. Catherine's Monastery, Sinai, Egypt)

The two images in Figure 2 show the response of the parchment side under ultraviolet illumination (365 nm), and under infrared illumination (940 nm). Note that the overwriting is dark under both illuminations, but the erased writing is dark in the ultraviolet image and is not visible in the infrared image.

The different responses, of the erased writing and the overwriting, can be used to enhance the erased writing for the scholar to read. In Figure 3, the top segment is a region of the side illuminated in natural light. This is how the leaf looks to the human eye in colour. The erased writing is reasonably legible in the margin on the right. Hints of the erased writing can be seen in the region of the overwriting, but, in general, the erased writing is indistinct and hard to read. Often, a simple combination of two of the spectral images, an ultraviolet image with a visible or infrared image (see Fig. 2), can be made either to suppress the overwriting, or to enhance the erased writing.

In a 'pseudocolour' image, the two images are combined in a manner which enhances the erased writing.[7] The result is a colour image in which the overwriting is a neutral gray or black, and the erased writing is coloured—in this case, coloured red (see the bottom part of Fig. 3). The colour of the erased writing makes it stand out from the overwriting and therefore easier to read. The contrast of the erased red writing in the pseudocolour image will not seem as dramatic to a red-green colourblind person as it does to the rest of the population.

Alternatively, the two images can be combined in a different manner to suppress the overwriting, thereby enhancing the erased writing in a monochrome image. In the middle part of Figure 3 is a 'sharpie',[8] which is the difference of the ultraviolet and visible images. This processed image tends to suppress the overwriting, making it look like the parchment. This suppression of the overwriting makes the contrast of the erased writing dominant. Depending on the condition of the parchment or the writing, or the colour vision of the observer, the erased writing may be more visible either in the pseudocolour or the sharpie, hence we produce both.

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[6] Rabin *et al.*, Initial inspection of reagent damage.

[7] Easton *et al.*, Multispectral imaging of the Archimedes Palimpsest, 2.

[8] Named after https://en.wikipedia.org/wiki/Robert_Sharples_(classicist) (accessed 01.07.2023), who preferred this image type.

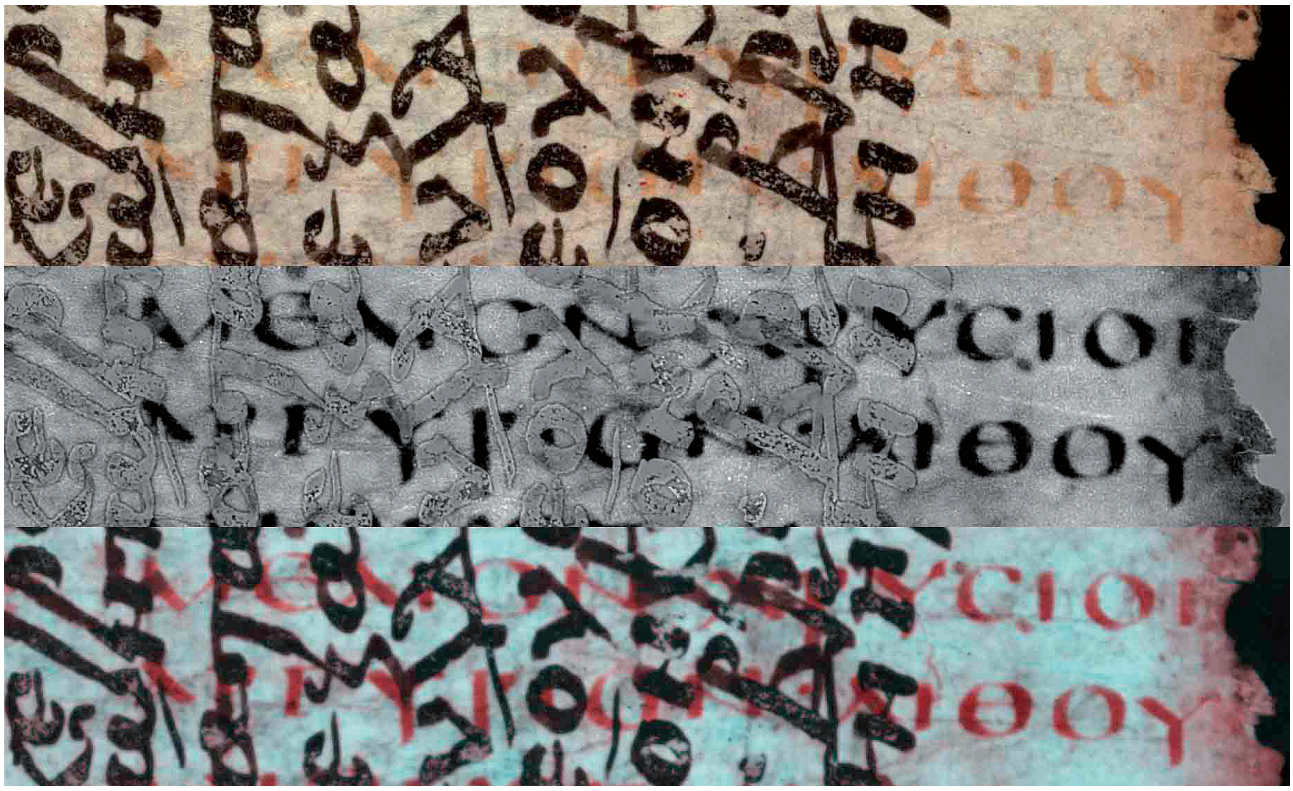

Fig. 3: Three processed images of the segment of the manuscript Sin. gr. NF MG 99, ff. 3v–4r. The top image represents the appearance in natural light. The middle image is a 'sharpie', while the bottom is a 'pseudocolour'. The erased writing is enhanced in the bottom two images, by suppressing the overwriting in the sharpie and inserting colour in the pseudocolour
(© St. Catherine's Monastery, Sinai, Egypt)

The combination of the two images in Figure 2, into either a pseudocolour image or a difference image (sharpie), is accomplished only after pre-processing both images. Directly out of the camera, the numbers in the two images may have completely different dynamic ranges, i.e. a corresponding white spot in each image may be represented by drastically different numbers, due to differences in exposure or to different detector sensitivities. If the ultraviolet and infrared images are inserted into a colour image, and the values of a white spot on the two images have different values, then that spot in the colour image will not be white, but instead will take on the colour of the image with the larger value. To make neutral colours be actually neutral in colour, the values of the two images need to be adjusted, so that corresponding white areas have comparable values.

Adjustments to the dynamic ranges of the two images are made with a 'normalization' algorithm.[9] This process slides a small window across each image. This window may be as large as 500 × 500 pixels for an 8,000 × 6,000 pixel image. At each location of the sliding window, the adjustment to the pixel in the centre of the window is determined by measuring the statistics of the data within the window at that location—namely, the mean and the standard deviation. The contrast of the centre pixel is adjusted by shifting the mean value from the measured mean to mid-gray, then stretching the contrast so that the minimum (black) and the maximum (white) values are each 3 standard deviations away from the mid-gray value.

This normalization process can produce problems around high-contrast regions in the data. When the sliding window initially encounters a high-contrast character, such a character of the overwriting, the standard deviation significantly increases. With a larger standard deviation in the data, a smaller contrast adjustment is called for. This means that regions around high-contrast characters appear to have a 'veil' of low-contrast enhancement around them. To counter this effect, a 'no-veil' normalization was developed that uses a mask that is aligned with the high-contrast detail in the image. Image values defined by the mask are not used in calculating the standard deviation, hence the contrast adjustment does not change within regions of the high-contrast data,

[9] Knox, Enhancement of overwritten text, 5.

thereby eliminating the veil. The mask is determined using a sliding window, adaptive version of the Otsu method of binarization.

After this 'normalization' process, the two images can now be combined together. Points that appear to have the same visibility will also have similar values in the normalized images. For example, the parchment in the two pre-processed images will have similar values, as will the overwriting. As a result, in the difference image (sharpie), the parchment and the overwriting will have similar values, and the overwriting will disappear into the parchment. The erased writing, on the other hand, will have significantly different values in the two normalized images, because the erased writing is visible in one and invisible in the other. In the difference image, this large difference shows up as a high contrast character, easily seen against the suppressed overwriting.

For the pseudocolour image, the normalized ultraviolet image is inserted in the green and blue colour separations of the pseudocolour image, while the normalized infrared image is inserted into the red separation. Since the overwriting, visible in both images, has similar values in both, it shows up in the pseudocolour image as a neutral gray, or a black colour. The erased writing, on the other hand, is bright in the red separation, and dark in the other two separations, making it a bright red colour. In this way, the high-contrast difference of the erased writing is turned into a strong colour difference in the pseudocolour image.

These two methods, the pseudocolour and sharpie, are simple to implement and quick to apply. For many cases, these two methods provide sufficient information for the scholar to read the erased writing. As long as the erased writing consists of iron gall stains in parchment, these two methods will give a good rendition of the erased writing.

ERODED PARCHMENT

The chemicals contained in iron gall ink are harsh and can erode the parchment. When they do, they can remove the residual stains from the erased ink, and a small amount of the parchment that held them. As a result, the parchment is thinner where the erased characters were located. Without the stains, the thinner parchment does not inhibit the fluorescence, so the characters are not darker under ultraviolet illumination. Because the parchment is thinner, though, there is a slightly smaller fluorescence response, due to the fact that there is less scattering of the fluorescence from the nearby parchment into that region. This results in ghost traces of the characters in the pseudocolour images. These traces look similar to the response of the writing that shows through from the other side of the leaf. As a result, the eroded characters do not show up in the pseudocolour as erased writing. Ultraviolet illumination does not help reveal the erased writing when the character stains have been eroded away.

Interestingly, although the regions of thinner parchment do not show up well in ultraviolet illumination, they show up beautifully in infrared transmission. This was discovered accidently by Michael Phelps in the beginning stages of the Sinai Palimpsests Project in 2009. Holding a leaf up to the light from a lamp across the room revealed white characters that could not be seen by the eye in normal reflection. This discovery led to the development of the transmission ratio algorithm.

Infrared light is the light that travels easiest through parchment, so when infrared light is shone through the parchment, these thinner eroded character regions are much brighter than the surrounding regions. Because the thinner eroded regions scatter less light, they allow more light through. The erased writing then can be seen as white characters on a darker background. The front surface overwriting also shows up in the transmission image. To suppress those characters, the transmission image is divided by the front surface, infrared reflectance image (940 nm), which contains mostly just the unwanted overwriting. This suppresses the characters on the front surface, making the erased characters more legible.

Remember that digital images are just arrays of numbers. As such, one can divide one set of numbers by the other. When the numbers are of comparable value (equal brightness), they tend to cancel in the ratio. When the denominator value is smaller (darker) than the numerator, it makes the ratio larger (brighter), and vice versa. Taking a ratio of two images is a way of suppressing a feature that is of comparable value in the two images.

When two images are divided, the resulting ratio is centred around unity with many of the values being close to unity. This is not a range of values that easily translates to a visible range of values. To get the resulting values in range, a 'normalization' of the ratio is performed. This process contrast stretches the result, making the details more visible.

The parchment leaf consists of two sides, the hair side and the flesh side. By its nature, the hair side is more resilient to the tannic compounds than the flesh side. As a result, it is the flesh side that is more susceptible to erosion from the ink. That means when light is transmitted through the parchment, the only white characters that are seen are from the flesh side of the leaf. Since the characters on the hair side typically are not eroded, those stains remain and can be enhanced with ultraviolet illumination and the pseudocolour or sharpie processing.

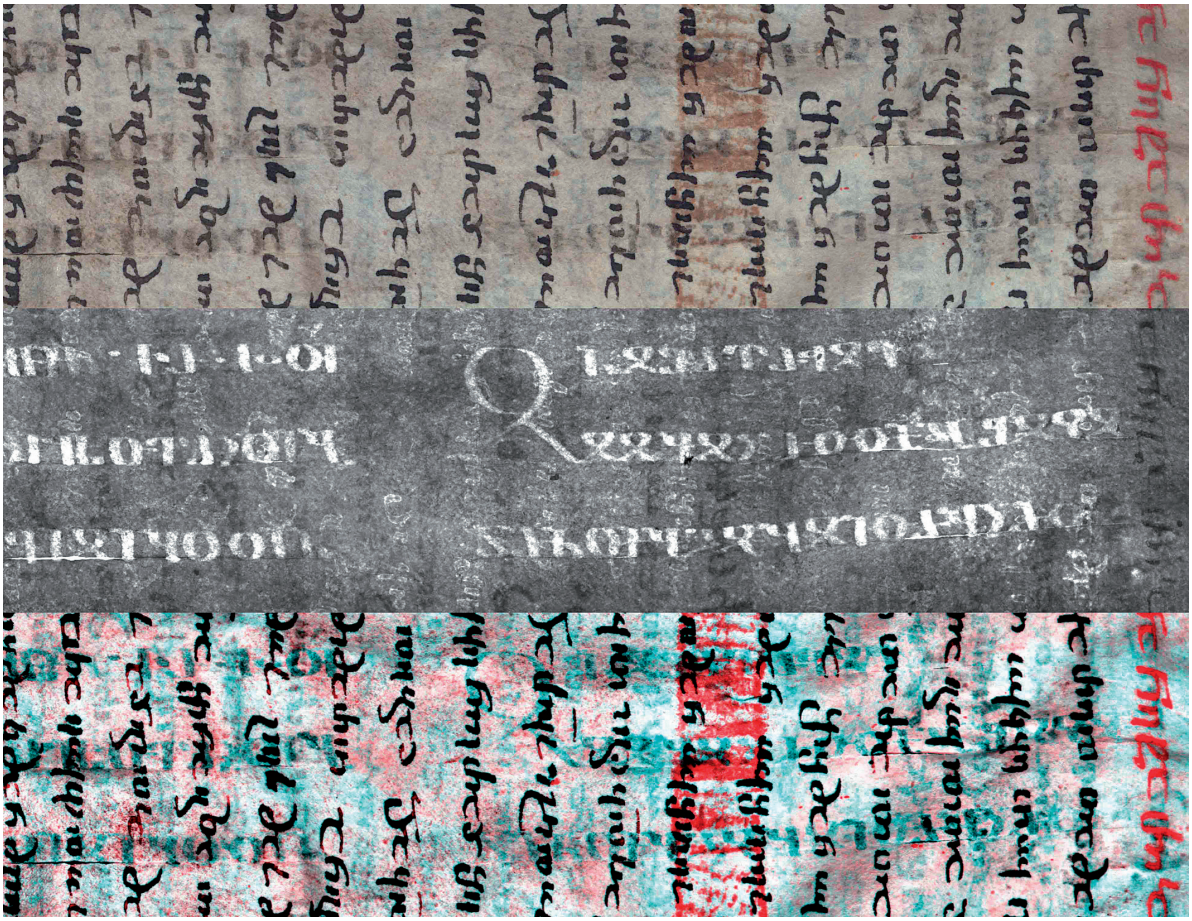

Fig. 4: The transmission ratio algorithm is valuable for eroded images, as in this segment of Sin. geo. NF 13, f. 59r. The natural light image (top) shows only smudges for the erased writing. The transmission ratio image (middle) of exactly the same region reveals the erased characters. The pseudocolour image (bottom) only shows coloured smudges. Ultraviolet illumination did not help here (© St. Catherine's Monastery, Sinai, Egypt)

A striking example of a transmission ratio image is shown in Figure 4. In the upper segment, hints of the erased writing are seen in horizontal lines of smudges. The bottom segment shows the pseudocolour image, which does not bring out the erased writing, but instead shows a coloured set of smudged characters.

In the middle segment is the transmission ratio image. In this image, the erased writing is clear and crisp, and the overwriting has been almost completely suppressed. Although the middle image appears dramatically different from the other two images in the figure, it is indeed the exact same region of the same leaf. Not all transmission ratio images are this good. Note that in some cases on this leaf, the bright characters are formed even in places where there is significant overwriting. This suggests to the viewer that perhaps the erosion had occurred before the leaf was erased and overwritten, otherwise the overwriting would also have fallen off when the erosion occurred.

When significant erosion of the text characters has occurred, typically on the flesh side of the leaf, the transmission ratio technique can be invaluable. When no erosion has occurred, normal ultraviolet illumination and processing work best. The work on the image of this leaf was done in consultation with Jost Gippert, as part of the Sinai Palimpsests Project.

RULING LINES, PINPRICKS, AND COCKLED SURFACES

Indentations in the surface of the parchment can indicate features of the manuscript that otherwise do not easily appear to the eye. At times, people have tried to use illumination at very shallow angles (raking light) to reveal textual indentations, but that has not been very successful. On the other hand, raking light images are successful at showing the patterns of cockling of the parchment, ruling lines, and pinpricks.

Special raking lights are positioned to the left and right sides of the sheet, so that the light they cast hits the parchment at a very shallow angle, just grazing across the surface. One of the raking light strips can be seen in Figure 1, just behind the person adjusting the manuscript. These light strips emit wavelengths in the blue and infrared regions of the spectrum. Under infrared illumination, the contrast of the writing is reduced, so that the surface is better revealed.

A processed raking image is created by taking the difference of the two infrared raking images. These two images show the overwriting clearly and at similar gray levels. By taking the difference, the text is significantly suppressed. On the other hand, the raking image does show small surface variations, such as the ruling lines and pinpricks. It also shows the wrinkles of the cockled surface distinctly. Because the indentations appear slightly shifted in opposite directions, when viewed with light from the two opposites sides, the shadows of the indentations do not cancel in the difference image, but rather are enhanced. Features such as ruling lines do not always show up, but if they are visible in a raking image, then that gives evidence of a layer of erased writing.

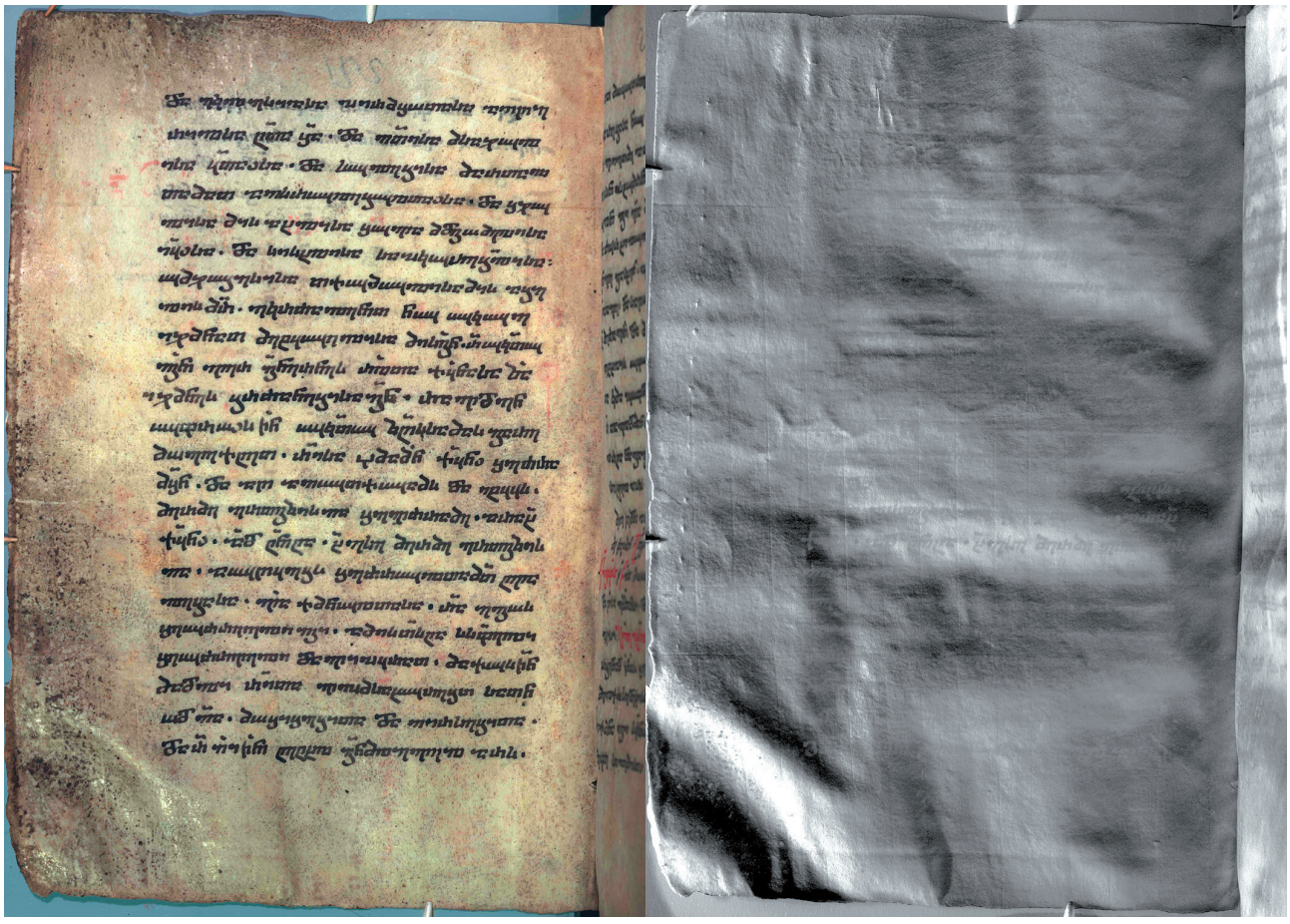

Fig. 5: The raking light image (right) of Sin. geo. 10, f. 221v, reveals the ruling lines and pinpricks that are not visible in the natural light image (left)
(© St. Catherine's Monastery, Sinai, Egypt)

Figure 5 shows a natural light image of a folio, along with its corresponding raking image. The natural light image has been illuminated with diffuse light and it shows little indication of surface variations. On the other hand, the raking image shows clear indications of pinpricks along the left margin and two sets of ruling lines,

one set oriented vertically and the other oriented horizontally. This second set of ruling lines can be used to indicate where erased characters might be expected on the folio.

FLUORESCING CHARACTERS

Usually, the residual stains of the ink do not fluoresce. Instead, they typically suppress fluorescence of the parchment, making the characters darker. In some rare cases, we have seen erased characters that appear to fluoresce. We do not know for certain why this happens. It may be that it is the parchment in the regions of the erased characters that fluoresces. Whatever the case, the result is white characters in a filtered fluorescence image. In the case shown in Figure 6, the top two segments are two different images captured under ultraviolet illumination. The upper segment was taken with a blue filter, while the middle segment was taken with a red filter. Note that the erased characters are darker than the parchment seen through the blue filter and are brighter than the parchment seen through the red filter. They were also brighter than the parchment when seen through the green filter. Because they are brighter in the green and the red, the erased characters are fluorescing in a colour that is more yellow than the parchment fluorescence, i.e. a colour fluorescence image would show yellow erased writing.

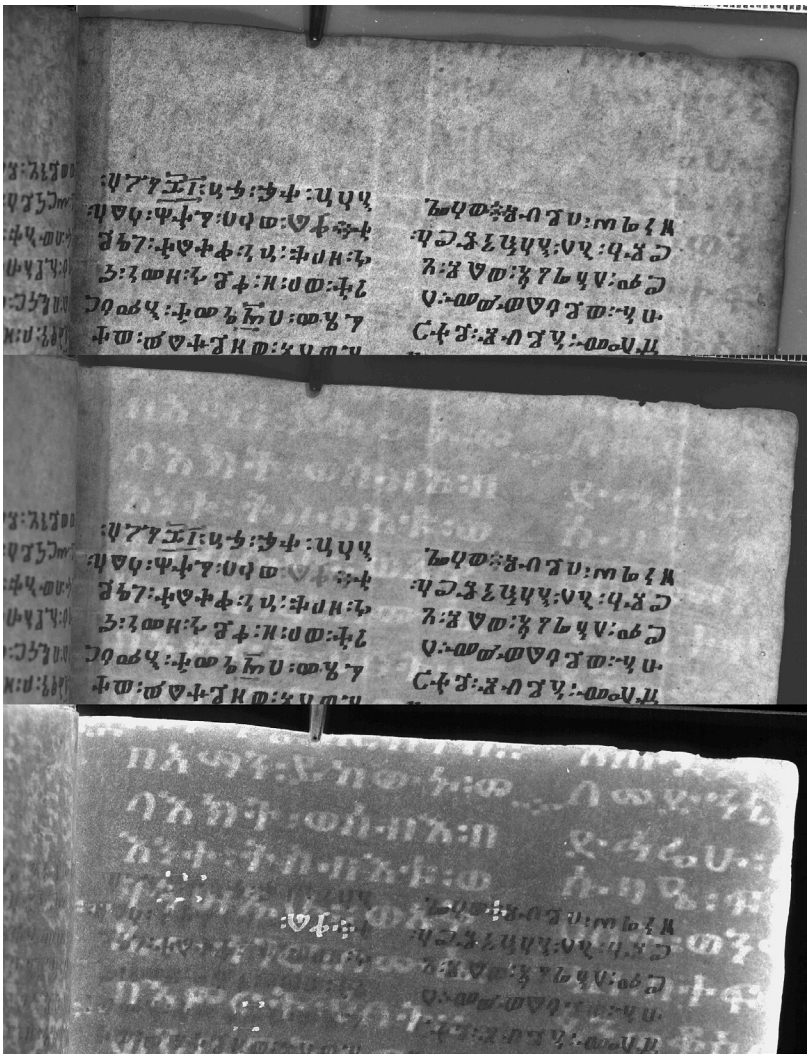

Fig. 6: A ratio of fluorescence images can enhance the erased writing, in the case where the erased writing fluoresces. The blue-filtered fluorescence image (top) shows characters darker than the parchment, while in the red-filtered fluorescence image (middle) the erased characters are lighter. Combining those two images in a ratio (bottom) significantly enhances the erased writing. This is a segment of Petermann II, Nachtr. 24, f. 94, an Ethiopic manuscript
(© Staatsbibliothek zu Berlin – Preussischer Kulturbesitz, Orientabteilung)

The fluorescence of the erased writing, visible in the middle segment in Figure 6, is not usual, but it can be utilized to enhance the erased characters. To enhance these characters the fluorescence ratio algorithm was developed.

The bottom image shows the ratio of the red-filtered UV image by the blue-filtered UV image. The dark characters correspond to low digital values. By dividing by a low number, one increases the value being divided. As a result, the white characters of the red-filtered image, when divided by the dark characters of the blue-filtered image, become even brighter. To enhance the features in the ratio image, the normalization algorithm is applied to stretch the contrast of the values, making them more visible.

The result, a fluorescence ratio image, is shown in the bottom segment. The erased characters are clearly visible in this image. When compared with the two filter fluorescence images, the fluorescence ratio shows more of the erased writing than either. This work was done together with Ted Erho and Loren Stuckenbruck on an Ethiopic manuscript at Staatsbibliothek zu Berlin.

CONCLUSIONS

The image processing techniques described in this paper have been developed by the author over the last two decades. The original pseudocolour and sharpie methods were developed as part of the Archimedes Palimpsest Project during the first decade of this century. The transmission ratio and the raking light algorithms were developed as part of the Sinai Palimpsests Project in the second decade. Lastly, the fluorescence ratio algorithm was developed in the last few years, to read the Petermann II Nachtrag 24, Ethiopic palimpsest.

In the author's opinion, the development of image processing techniques to reveal erased text in palimpsests or damaged manuscripts is still in its infancy. Every new project introduces new conditions of parchment, inks, or environmental damage that require different approaches to recover erased or damaged writing. As these new algorithms are developed, it is important to understand the underlying physics of the degradation to see how to construct the algorithm that will reverse the damage and reveal the missing writing. This understanding will also help others to determine when a specific tool might be applicable to another manuscript.

The software that implements these algorithms was originally written in the C-language to be run on UNIX platforms. This software was reimplemented in Java to make it available for people to use on other computer platforms, such as macOS and Windows. In addition, a graphical user interface was added to make the software easier to use and to understand. This software, called Hoku, is available on http://r-chive.com/software.

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Multispectral Image Collection and Statistical Processing of Palimpsests at St. Catherine's Monastery*

INTRODUCTION

The text in many parchment manuscripts of historical value often is difficult to read. This is particularly true for manuscripts that have been deliberately erased and overwritten, thus forming 'palimpsests'. In such cases, the contrast between the erased ink and the parchment as seen by the eye usually is reduced to the point where it may be difficult or impossible for human readers even to identify the existence of erased characters. This is due in part to limitations of the human visual system, such as the relatively narrow range of spectral sensitivity of the retinal cells of the eye. The eye is sensitive to wavelengths λ only in the interval from blue light ($\lambda \approx 400$ nm) to red light ($\lambda \approx 700$ nm). Because useful information about the text often exists outside of this range, this is a significant constraint.

Fortunately, erased or damaged writings often may be recovered from images obtained with modern sensors, which can record light over a wider range of wavelengths than that to which the human eye is sensitive. The most common photoelectronic detectors are based on silicon and are sensitive from the ultraviolet part of the spectrum ($\lambda \approx 350$ nm) through the visible region ($400\text{ nm} \lesssim \lambda \lesssim 700$ nm) and into the infrared region out to $\lambda \approx 1100$ nm. Sensors based on other materials or compounds, such as indium antimonide (*InSb*) or mercury-cadmium-telluride (*HgCdTe*), are capable of recording light with yet longer wavelengths, but cost and other factors have kept these sensors from being widely applied to cultural heritage imaging.

Other characteristics of the human visual system also detract from the ability to read erased or damaged writing. The human eye-brain visual system is capable of producing useful images over a very wide range of ambient lightness levels (from bright sunlight to faint objects in the night sky), but this capability arises from involuntary physical and photochemical mechanisms that adapt to the ambient lightness level. The physical mechanism is the variation in the diameter of the eye pupil to admit more light from faint scenes, while different photochemical receptors are used at different light levels. The involuntary adaptation of human vision means that perceptions of feature brightness and visibility are not comparable to the perceived responses under other ambient conditions (this is the basis for some familiar 'optical illusions'). Beyond that, the human eye is capable of distinguishing only a limited range of lightness levels at any one level of brightness adaptation, which means that the 'intensity' of light from distinct features must be sufficiently different to be perceptible, even without the added complication of different ambient conditions. One additional observation deserves emphasis: the important point that images from the human eye are retained in human memory, whose familiar imperfections further complicate assessment of similarities or differences in different scenes viewed at different times; remembered appearance is rarely useful for comparisons. In short, it is very difficult for the human visual system to consistently perceive small differences in intensity from different features.

The advantages of modern photoelectronic sensors over the human visual system for the application to

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cultural heritage are diverse. First, sensors are capable of measuring smaller differences in light 'strength' over a wider range of ambient conditions than the human eye. In addition, the sensors also are not susceptible to variation in the perceived lightness levels due to the involuntary adaptation mechanisms that 'confuse' the eye. Put another way, modern sensors can 'see' light over a wider range of wavelengths and can repeatedly record more distinct 'lightness' levels (often called 'gray levels' or 'digital counts') than the human visual system, without being affected by psychological factors.

In addition, images measured by modern photoelectronic sensors are recorded as integer numbers in durable memory, and these numerical values may be compared or enhanced to make small differences more visible to human observers. Of even more significance, images recorded from camera systems may be combined digitally (by summing/averaging and/or differencing) or analyzed using statistical metrics, with the goal of enhancing the feature(s) of interest. This may enable the scholar to visualize very small differences in contrast between erased ink and parchment that are not visible to the eye alone.

SPECTRAL IMAGING SYSTEMS

The collection of imagery over wider ranges of wavelength bands than are visible to the eye has become rather common in studies of cultural heritage over the last two decades or so. These 'spectral imaging systems' are often classified depending on the number and configuration of the spectral bands and how light from each is dispersed into the spectrum of constituent wavelengths. 'Multispectral' imaging (MSI) systems collect a relatively small number of wavelength bands, up to a few dozen. These bands typically span fairly wide spectral ranges and may overlap or be disjoint. These systems restrict the measured light to specific bands either by applying different colours of illumination to the object or by placing 'coloured' filters at the camera lens that transmit different wavelength passbands through the lens to the sensor. Most such multispectral systems use two-dimensional sensor arrays and sequentially measure images in each spectral band of the entire object. The spatial resolution of these images is generally rather 'fine' (better than 25 pixels per mm, corresponding to 600+ pixels per inch).

'Hyperspectral' imaging (HSI) systems collect a much larger number M of image bands, where typically $20 \lesssim M \lesssim 500$ or so. These spectral bands are usually narrow and often contiguous, though often with coarser spatial resolution. Hyperspectral systems often illuminate the object with white light and disperse the reflected light into its spectrum by a diffraction grating or prism. In the most common systems, the spectra of all pixels along a 'line' of the object are measured simultaneously by dispersing the light from each pixel in the line into spectra that are measured on a two-dimensional sensor array. The object is translated past the entrance slit of the optical system to evaluate the spectrum of the next line on the object, and the process continues by scanning the object to build up its spectrum 'line-by-line' in sequence. The spectral resolution of hyperspectral systems can be quite fine and may be sufficient to enable identifying and quantifying constituent materials by comparing the observed response at a pixel to a library of recorded spectra. This capability to analyze constituent materials is a significant advantage for HSI systems, though the limited spatial resolution can be problematic. Though the processing methods considered here are applicable to HSI, and though these systems are being utilized more often for studies of cultural heritage, they will not be considered further here.

The last category of spectral imaging system is called 'ultraspectral'. Such systems use an interferometer to obtain even finer spectral resolution, though the spatial resolution and field of view usually are quite limited. Ultraspectral systems are only now becoming available and their use, particularly in cultural heritage, is very uncommon, so they will not be considered further here.

Based on these generally-accepted definitions, the vast majority of imaging systems used for cultural heritage should be classified as 'multispectral', because of the relatively small number of 'wide' spectral bands with $\Delta\lambda \gtrsim 40$ nm. As the costs of hyperspectral and ultraspectral systems decrease, we can expect to see more instances of their application to cultural heritage objects. For example, the Conservation Science Laboratory at the Bodleian Library of the University of Oxford has utilized the capability for true HSI for study of cultural heritage artifacts. Significant discoveries have been made about the Gough Map using this system.[1] However, the rest of this discussion is restricted to the use of multispectral imaging to recover erased text from the palimpsests in the collection at St. Catherine's Monastery.

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[1] Bai *et al*., Hyperspectral analysis of cultural heritage artifacts.

IMAGE MODALITIES

All readers are familiar with images of light reflected from the surface of an object. Useful information is also obtained from images of light that interacts with the object in other ways. The potential value of imaging light transmitted through a palimpsest may be obvious, and has proven to be very useful for cases where ink acids have 'thinned' the flesh side of parchments. Also of great value is imaging of light generated by fluorescence, which is the physical mechanism where light of shorter wavelengths (often ultraviolet) is absorbed by parchment or ink, followed by emission of longer wavelengths. The number of photons generated by fluorescence is largest at wavelengths just longer than the stimulating light, and this number decreases as the wavelength is increased. The spectral character of the fluorescence often conveys important information about erased text, and may be captured by placing transparent coloured filters in the optical path prior to the sensor to reduce the range of imaged wavelengths. In the system at St. Catherine's Monastery, fluorescence is imaged through blue, green, orange, and red filters. These filters further reduce the already small fluorescence signal, often to the point where the light available for imaging is very faint. Such conditions can have significant detrimental consequences for the quality of the recorded images, as will be described shortly.

IMPORTANCE OF IMAGE QUALITY

To ensure the best possible recovery of erased text, it is imperative to record 'high-quality' images for subsequent processing, particularly in cases where the goal is to enhance very subtle differences among parchments and erased inks. The 'quality' of an image depends on the capabilities of both the camera lens and the sensor. The scientific study of 'image quality' is a broad subject, and its effects on processed images is an ongoing research area, so we will only touch on some significant points here.[2] The 'quality' of an image describes the ability to distinguish two characteristics of the scene from the recording: (1) fine spatial detail and (2) small differences in the 'lightnesses' of features in the scene. The first of these is called image 'sharpness', and is determined by the performance of the lens and by the sizes of pixels in the image sensor. The second attribute of image quality often is described by the metric 'signal-to-noise ratio' (SNR), which quantifies the precision of lightness measurements recorded at each pixel that may be expected from the system. From its very name, it is apparent that SNR is the arithmetic ratio of two different numerical measurements. The numerator in the ratio is the amplitude that ideally would be measured at a pixel based on the physical conditions. The 'noise' term describes the collective random variations in the measured amplitude that could arise from a number of thermal, electronic, or numerical ('statistical') mechanisms.

A preliminary discussion of the nature of light and its impact on imaging is necessary before considering further details of image quality. Note that some researchers restrict use of the term 'light' only to wavelengths visible to the human eye, while insisting that ultraviolet and infrared bands must be called 'electromagnetic radiation'. We adopt the less anthropocentric view that the term 'light' applies equally well to all electromagnetic radiation, whether visible or not.

There are three models of light that are applied in different circumstances: (1) light as a 'ray', (2) light as a 'wave', and (3) light as 'packets' of energy (called 'quanta' or 'photons'). The first model, unfortunately called 'geometrical optics', is the simplest and most common view of light. It assumes that energy propagates in straight lines, without spreading, until the light encounters a medium with a different velocity of propagation. At the interface between media, the propagation direction changes as determined by the well-known Snell's law for refraction. This first simple model of light propagation is used for designing lenses and optical systems, but does a poor job of explaining phenomena that are important in imaging, such as image 'sharpness' (also called 'spatial resolution').

The wave model of light (referred to by the equally unfortunate name of 'physical optics') is more mathematically complicated than the ray model, but also more complete because it explains the unavoidable 'spreading' of energy during propagation, which is commonly called 'diffraction'. This spreading of energy means that light energy 'bleeds' into regions that would be 'shadowed' in the ray model. This spreading results in the ultimate limit to spatial resolution of the image. A simplified view of spatial resolution may be visualized

[2] Peery *et al*., Image Quality in Cultural Heritage.

using a model of the scene as consisting of two light sources of infinitesimal size—so-called 'point sources' of light. These two sources are separated by a dark space of variable width. The desired ideal image would be an exact replica of the two points of infinitesimal size for any possible spatial separation, which would mean that the two sources would always be distinguishable from the recorded image. This fortunate situation is physically impossible due to the wave nature of light, which ensures that light does not propagate as straight 'rays' of energy, but rather the energy 'spreads' during propagation. One result is that the images of the two point sources formed by a lens are themselves finite in extent instead of the infinitesimal point images in the ray model. The consequence is that the finite-sized image 'spots' generated from two closely-spaced point objects will be created at the sensor, and may overlap if the sources are sufficiently close together, to the point where these overlapping spots may not be distinguishable from the recorded image. The smallest separation at which the images of two point objects often is called the 'spatial resolution' of the imaging system and is determined by both the performance quality of the lens and by the properties of the sensor. The ultimate limit to spatial resolution often is the size of the diffraction 'blur spot' generated from a point source by the lens. This size is proportional to the wavelength of the light and the 'focal ratio' or 'f/number' of the lens, which is the ratio of the focal length to the aperture diameter. It is also limited by imperfections in the lens design and fabrication (the 'aberrations' of the lens).

The third model of light as 'quanta' or 'photons' of energy is necessary in order to understand the action of sensors, whether of older photochemical emulsions or of modern photoelectronic devices. Einstein showed that the energy conveyed by a photon of light is proportional to the reciprocal of the wavelength, so that photons of short-wavelength light have larger energies than longer wavelengths. The 'strength' or 'intensity' of light is determined by the number N of photons that reach the sensor from the object, and statistical uncertainties in this number often result in the ultimate limit to the SNR. The energy of a photon is absorbed by the lattice of atoms (usually silicon) in the sensor. The energy is transferred to electrons, which form an electric current that may be measured, which produces an estimate of the strength of the incident light.

To illustrate the impact of the uncertainty in the number of quanta on the measured signal, consider the case where each pixel is exposed to a region of constant 'lightness' on the object, which should result in the same numerical measurements at each pixel. However, variations in the measurements introduce error in these numbers, which is quantified as 'noise', and which affects the measured values. For example, the uncertainty may be due to unavoidable variations in the number of photons incident on each pixel during the exposure time. For statistical reasons beyond the scope of this paper, the statistical uncertainty in the number of photons N counted at each pixel is the square root $\sqrt{N}$, which means that the SNR is the ratio of the expected number N to the uncertainty $\sqrt{N}$, so the SNR is $\sqrt{N}$. Consider the simple example of a sensor exposed to the field of photons from an object that uniformly reflects light so that each pixel ideally would count 10,000 photons. The statistical uncertainty in the number is $\sqrt{10{,}000} = 100$ photons, so the resulting SNR is 10,000/100 = 100. For a faint object field that emits 100 photons in the same exposure time, as might happen in fluorescence imaging, the resulting SNR = $(100)/(\sqrt{100}) = 10$, smaller by a factor of ten. In words, there is a larger 'uncertainty' in the 'strength' of the signal as measured by the number of counted photons for weaker signals. Since the number of photons is usually small in spectral fluorescence imaging, so is the resulting SNR, and pixels that should measure identical signals can exhibit wide variations that are due simply to the photon statistics. In cases where the measurement uncertainty approaches the true signal differences, the task of enhancing the differences for assessment by scholars is significantly complicated. Such situations detrimentally impact the results of subsequent image processing intended to enhance differences between object features. The measured number may be increased by some combination of longer exposure times or larger pixels. It is therefore necessary to find the 'sweet spot' that relates pixel size to exposure time that produces adequate performance of both spatial and noise aspects. Efforts are underway to define metrics that would better characterize system performance by simultaneously considering both aspects of image quality.

We now return to the first aspect of image quality, that of 'sharpness', which we have stated is determined by the performance of the lens and the characteristics of the image sensor. We have already seen how the ability of the system to resolve closely spaced features is limited by the size of the diffraction spot, but it also is affected by the spacing of the pixels in the sensor; it is not possible to resolve two spots of light that are both incident upon the same single pixel. However, camera vendors often emphasize pixel size, number, and spacing as the primary determinant of image 'sharpness', because the sensor spacing is an easier concept for

the user to comprehend. The common strategy is to make sensors with larger numbers of smaller pixels and claim that the resulting camera produces better pictures. For example, one common sensor used in cultural heritage imaging has 50 million pixels, each being a square with linear dimension of 6 micrometres. A new sensor using a different measurement architecture has 100 million pixels with a linear dimension smaller than 3 micrometres. The manufacturer will always claim that a sensor with smaller pixels has better image sharpness than a sensor with larger pixels. There certainly is merit to this approach in many common imaging settings with plenty of light available, as in imaging of spectral reflectance, but the situation for fluorescence imaging of manuscripts is more complicated because of the impact of the SNR of the recorded signal. SNR is critically important in cases where the subsequent image processing is aimed at discriminating between subtly different features (such as 'well-erased' text from the underlying parchment). Since the SNR is proportional to the square root of the number of counted photons, and since a smaller pixel will count fewer photons than a larger pixel under the same exposure, the SNR measurement will be smaller in proportion to the area of the pixel. This difference can be result in significant detrimental impacts on the subsequent image processing, particularly when imaging spectral fluorescence with its inherently small number of generated and recorded photons is inherently small.

One other aspect of image 'sharpness' is often not considered with sufficient care in systems that image over the wavelength range wider than that of the sensitivity of the human eye. The system at St. Catherine's Monastery produces images over the range $365\,\text{nm} \lesssim \lambda \lesssim 940\,\text{nm}$, whereas camera lenses are normally designed to produce sharply-focused images in visible light only ($400\,\text{nm} \lesssim \lambda \lesssim 700\,\text{nm}$). This means that lenses designed to image only at visible wavelengths will not simultaneously focus light outside the visible range upon the sensor; the images at these wavelengths will be 'blurred', thus jeopardizing the success of subsequent image processing. Though it is possible to 'refocus' the lens at the longer wavelengths, the image magnifications will vary with focus setting, which adds complexity to both the collection process and to subsequent image processing.

One additional point of importance is the need to 'calibrate' the collected data to relate the measured numerical values to the physical properties of the object. This is most commonly done by comparing the 'raw' measured gray value of a pixel in each band to the corresponding value of a group of reference pixels with known properties of reflectance, fluorescence, and/or transmittance. Since images are collected beyond the visible range, the references themselves must be well calibrated over the full range of wavelengths as well, which most common 'colour charts' are not. For calibrating reflectance and fluorescence, standard materials made from Spectralon® are commonly used. This is a Teflon derivative with very uniform reflectance over wavelengths from 250 nm in the ultraviolet region to 2500 nm in the near-infrared spectrum—in other words, its spectral reflectance is very 'flat'. Spectralon® references are available from Labsphere, Inc. with different specified reflectance values ranging from 2% ('black') to 98% ('white'). It is recommended that both 'dark' and 'light' standards be included in the field of view; these will allow the images to be calibrated accurately and are essential for subsequent statistical processing. In our work, we use a custom Spectralon® calibration target with reflectances of 2%, 50%, and 98%, which allows accurate calibration of the reflectance.

In 2013, when the images used in the processing example were collected, the image set included 12 reflective bands over the range from the ultraviolet region at 365 nm through the visible to the infrared bands to 940 nm, eight transmissive bands, and eight spectral fluorescence bands (six under ultraviolet illumination and two under blue-light illumination). In addition, two 'raking-incidence' exposures for both $\lambda = 455\,\text{nm}$ (blue) and $\lambda = 870\,\text{nm}$ (infrared) with the illumination at a low 'raking' angle were included. These exposures occasionally reveal low-relief information, but were not used in the processing reported here.

IMAGE PROCESSING AND RENDERING

Once the multispectral images of a palimpsest have been collected, the goal is to combine them to enhance the visibility of the erased text. Based on experience in multispectral imaging and image processing of cultural heritage acquired over more than two decades, we have found that 'pseudocolour' images of selected image bands often result in text that is sufficiently enhanced for legibility. Dr. Keith T. Knox, of the Early Manuscripts Electronic Library, has developed and continually improved methods for creating pseudocolour renderings of multispectral image sets from the time of our initial work on the Archimedes Palimpsest in the first decade of

the new millennium (further details are available in his submission to this volume).[3] A further development of this technique was recently applied to multispectral imagery from the Zacynthius palimpsest at Cambridge University Library.[4] Though often very successful, there are cases where these renderings may not sufficiently enhance the contrast of erased text in some areas of damaged leaves or on entire leaves. In such cases, it often is helpful to apply processing algorithms based on the spectral 'statistics' of the collected bands within these local areas.

The spectral statistics are numerical descriptions of the 'lightnesses' in all bands for each pixel in the image field. We can visualize the concept by considering a system that collects images under M different wavelength bands in reflectance, where $M \geq 12$ for reflectance imaging with modern multispectral imaging systems. The numerical gray values of each pixel in a M-band multispectral image may be represented as a vector with M components, which places each pixel at a specific location in an M-dimensional space. Because our experience is constrained to three spatial dimensions, we cannot visualize pixel vectors from spectral images with $M > 3$, but such vectors may be represented, characterized, and manipulated in digital computers. We expect that the statistics of the vectors for an ensemble of pixels belonging to a specific 'feature' of the image (such as 'erased undertext') should exhibit spectral similarities and therefore the corresponding vectors for pixels belonging to a specific class should form a local 'cluster' in the M-dimensional space. Pixels from the other object classes should have different colours and lightness levels, and therefore should cluster around other distinct locations in the space of vectors. Of course, in bands where the SNR is low, the uncertainties in the measured signals will affect the locations of the endpoints of the vectors so that the corresponding clusters 'spread out' and/or the centroid of the clusters may be displaced. As a result, the clusters corresponding to different features on the leaf may overlap (e.g., erased text and nearby parchment), which makes the task of distinguishing among the image features more difficult. This is a further illustration that the SNR of the measured signal must be 'sufficiently large' for the image features to be distinguished correctly.

Different methods are available for analyzing the statistics of local regions and may be applied to 'enhance' or 'tighten' this clustering and therefore improve the ability to segment the pixels that belong to each of the different feature classes. These methods will be considered individually.

The relative utility of results obtained from the two general processing methods of pseudocolour renderings and statistical processing has resulted in a two-tiered workflow. All leaves are batch processed to form pseudocolour images, which are examined and transcribed by the scholars. In the course of the transcription, the scholars identify local areas (or even full leaves) that remain difficult to read, which are then prioritized for subsequent statistical processing using the methods to be described in this paper.

MULTISPECTRAL IMAGE PROCESSING METHODS APPLIED TO THE ST. CATHERINE'S PALIMPSESTS

The primary algorithms based on the spectral statistics that were used to process multispectral imagery from the collection of palimpsests at St. Catherine's Monastery are: Principal Component Analysis (PCA), Minimum Noise Fraction (MNF), Independent Component Analysis (ICA), and Spectral Angle Mapping (SAM). Because the different methods use different assumptions about the spectral characteristics of the image data, it should not be surprising that the results obtained from the various methods will differ. For this reason, it often is useful to form pseudocolour renderings of outputs from the different methods, which may be manipulated subsequently by the imaging scientist or scholar to enhance the visibility of different features of interest. As one example, dynamic variation of the 'hue angle' of the pseudocolour image often reveals information to the eye that was previously imperceptible.

The calibrated image bands are collected to form an image 'cube' of data utilized by *ENVI*. Each cube is 'calibrated' to the numerical reflectance from the Spectralon® target in the scene for the reflectance and fluorescence bands; spectral imagery in transmittance are calibrated based on unobscured areas. This calibration evaluates the ratio of the measured 16-bit integer value at each pixel to the average signal reflected from the 98% broadband Spectralon® reflectance in that spectral band. The result is a 32-bit floating-point number for

[3] Christens-Barry *et al.*, Imaging and Image Processing Techniques.
[4] Houghton *et al.*, *The Palimpsest Catena of Codex Zacynthius.*

each band at each pixel, which means that the calibrated image cube requires twice the storage space of the original image data.

Our experience has shown that the processed results are often improved by an additional preprocessing step, to remove gross variations in the background of the spectral image. This step evaluates the ratio between each band and a replica that has been locally averaged, or 'blurred,' over a linear scale larger than the features of interest (e.g., larger than the stroke width of the pen used to write the overtext). This 'blur-and-divide' step attenuates the visibility of any large-scale 'patchiness' in the parchment background that is often due to staining or shading. The statistics used in the subsequent processing will then not be dominated by such gross spatial variations, which rarely have significance to the readings. The images after the 'blur-and-divide' preprocessing appear to have a 'flat' background, with the original large-scale variations much reduced.

For ease of comparison in this discussion, the four different processing methods were applied to one leaf: f. 103r from Sin. ar. 514. The images were collected in 2013, with a monochrome sensor producing images of size 6132 pixels by 8176 pixels at a spatial resolution of approximately 687 pixels per inch (27 pixels per millimetre). Figure 1 shows the visual appearance of the full image, including the Spectralon® reflectance references and a colour calibration chart from X-Rite, Incorporated. These were located at the bottom and left side of the image, respectively. Since the colour chart is calibrated only for visible light, it is used only to create the image of the true visible appearance – the reference values are not useful for bands in the ultraviolet and infrared regions of the spectrum. We should note that restricting the illustrated examples to this one leaf will not illustrate all methods in their best light, since the specific statistical properties of this leaf can be expected to respond to some methods better than others.

In the time frame of the project, the image set included twelve reflective bands from ultraviolet through infrared, four bands with raking illumination, seven bands of fluorescence under blue and ultraviolet illumination, and eight bands of transmission from blue through infrared. In nearly all cases, statistical processing is applied to subsets of these 31 bands, such as just to the reflectance bands. In all cases shown, the processing was applied only to the 7 fluorescence bands after 'blur-and-divide' preprocessing, where each spectral band was locally averaged over a square area with linear dimension of 101 pixels.

The image processing algorithms used here are available in the *ENVI* software package from L3Harris, Inc. *ENVI* was designed and is usually used for the processing of imagery for environmental remote sensing, but it has proven to be also very useful in studies of historical artefacts. Fortunately, both authors resided at the time at the Chester F. Carlson Center for Imaging Science of the Rochester Institute of Technology, which is an *ENVI Center of Excellence*, and were therefore able to access the software easily.

PRINCIPAL COMPONENT ANALYSIS (PCA)

This method for statistical analysis was invented by Pearson in 1901.[5] PCA combines the images in a set of *M* spectral bands to create an 'equivalent' set of *M* bands that exhibits a specific correlation property. The two sets are 'equivalent' because the transformations in both directions are available from the calculation. In other words, the original set of *M* bands may be reconstructed from the *M* output principal components. The specific property of the processed bands is that *M* PCA bands are 'uncorrelated'—any statistical similarities among the images in the original set of bands will not exist in the set resulting from the processing. In addition, the *M* output bands are sequenced in order of statistical 'variance'; the band with the largest variance (loosely corresponding to the widest range in numerical values or widest contrast) appears first in the sequence of *M* output bands, while each succeeding processed band exhibits both no statistical correlation to and less variance than any previously-evaluated output band in the sequence. In this way, the last bands in the calculated sequence exhibit the smallest variance and therefore the smallest variation in image contrast.

The first step in the PCA calculation is to select the region where the spectral statistics are evaluated; these statistics determine the subsequent processing. This region might be the entire scene, but it is much more common to select a small region dominated by the feature of interest (e.g., erased text). Since all pixels of the same object feature tend to have the same 'colour', we expect the endpoints of vectors for pixels belonging to each class of object will 'cluster' in the *M*-dimensional spectrum space, so that pixels from distinct object

[5] Pearson, On Lines and Planes.

features will appear at noticeably different locations in the *M*-dimensional space. The PCA calculation assumes that each 'cluster' may be described by a Gaussian statistical distribution (the well-known 'bell curve'), which means in turn that only second-order statistics (variances) are significant, and that there are no asymmetries in these clusters, such as 'skew' or 'kurtosis'.

The first step is to determine the axis in the *M*-dimensional data space that spans the widest variance of data for the selected region. The original data for the entire image are then projected onto this axis in the *M*-dimensional space, with one end of the data projection specified as 'black' and the other as 'white'. The end result is a monochromatic image of the first principal component. Next, the axis orthogonal to the first such that the data subset spans the widest remaining variance is then determined, the *M*-dimensional data are projected, and the endpoints mapped to 'black' or 'white' to evaluate the second principal component. The process repeats for each of the *M* dimensions, resulting in a new representation of the original *M* bands of data sequenced in order of image 'variance'. The calculation is fairly intensive and often requires considerable time to run.

Note that the calculation of the orthogonal axes depends upon the scaling of the image data. To obtain reproducible and comparable results, the original spectral image data must be accurately calibrated based on measured reflectance standards, lest the results be affected by nonintrinsic factors, such as different absolute exposures in different wavelength bands.

The fact that the axes in the calculated coordinate system are orthogonal means that the output image bands are 'uncorrelated'. The *ideal* outcome of PCA would be a set of output bands such that each displays a single feature of the scene, which means that the desired feature (usually, the erased text) would appear in a single PC band and that all other features of the scene would have identical gray values that differ from the level of the feature of interest. However, this happy situation rarely occurs—the desired feature generally appears in multiple principal components. In these cases, it is often useful to render 'pseudocolour' images by inserting PC bands into the red, green, and blue channels of a visible colour image; this image may then be enhanced, either statically by the imaging scientist or dynamically in display software by the scholar to enhance the visibility of the desired text.

Often the highest-order PCA bands with the small variances are dominated by random variations in the image data (which is called 'noise'), while the 'true' image structure is most visible in the lowest-order bands. Since the noise is now segregated from bands with 'nonrandom' or genuine structure, the higher-order bands with noise may be discarded. The inverse PCA calculation can then reconstruct the original image bands without the random variations. This means that PCA is useful for 'denoising' spectral image data. It also is useful for determining the effective number of image bands in the original data.

An example comparing the visual appearance of the leaf with a pseudocolour result from PCA evaluated for the eight fluorescence bands on the leaf Sin. ar. 514, f. 103r is shown in Figures 2(a) and 2(b), respectively.

MINIMUM NOISE FRACTION (MNF)

Similar to PCA, the minimum noise fraction transform also produces the set of *M* image bands into a new set of *M* bands that are sequenced according to a noise-content description of 'image quality'. The end result is similar to that from PCA, but MNF often does a better and more reliable job of identifying and removing noise from the data than is possible with PCA alone.[6] The goal of MNF is to identify component bands that contribute to the SNR of the ensemble of bands in the most significant manner. The covariance of the noise is estimated from the image data directly, and often produces a result that is better than that from PCA alone.

A pseudocolour result from MNF of the seven fluorescence bands of Sin. ar. 514, f. 103r is shown in Figure 2(c). The colour rendering was manipulated by subsequent processing by Adobe Photoshop® to maximize the visibility of the erased text.

[6] Green *et al.*, A transformation for ordering multispectral data.

INDEPENDENT COMPONENT ANALYSIS (ICA)

Just as for PCA, the goal of ICA is separation of *M* spectral bands into individual signals from the constituent components, but ICA produces 'statistically independent' rather than 'statistically uncorrelated' signals.[7] Though conceptually similar to PCA, ICA applies less stringent assumptions to the original data and uses higher-order statistical correlations to determine the transformation. This means that ICA is somewhat more capable of segmenting feature(s) of interest into different output bands.

A common illustration of the concept of ICA is the solution to the so-called 'cocktail party problem', where each of an ensemble of observers hears a mixture of sounds from a roomful of independent conversations, and the processing task is to isolate the individual conversations from signals recorded by different microphones scattered about the room. Each conversation is analogous to an individual feature on a palimpsest leaf (e.g., 'overtext', 'undertext', 'mould', 'parchment', etc.), and the measured signal from each individual microphone corresponds to a different spectral image band. The ICA calculation looks for differences in the measured signals that satisfy a condition for 'statistical independence'. If the different conversations are truly independent (as they would usually be in a cocktail party), ICA usually is able to segment the signals into their constituent components.

By analogy with the variances of the different PCA bands, ICA bands may be sequenced based on a calculated metric called 'spatial coherence'. This is evaluated by mathematically comparing, or 'correlating', translated replicas of each ICA image band to the undisplaced band. If the correlation between a replica displaced by a large physical distance across the scene remains high, then the image is assumed to have spatial structure corresponding to useful information and thus a large 'spatial coherence'. If the correlation between replicas for large displacements is small, then the image is assumed to consist primarily of 'random noise' that is not usefully interpreted, so the 'spatial coherence' is small. The set of ICA output bands may be sequenced in descending order of spatial coherence to form a set of ICA outputs that are analogous to the PCA sequence.

Again, as in PCA, the desired feature of erased text rarely appears in a single ICA band, so dynamically changing renderings of pseudocolour images may reveal or enhance subtle text information. However, in the example of ICA processing Sin. ar. 514, f. 103r from the seven fluorescence bands, ICA band #2 in Figure 2(d) rather successfully shows the erased text. The pseudocolour result from three of the seven ICA output bands in Figure 2(e) is only marginally different from the single band.

SPECTRAL ANGLE MAPPING

Recall the visualization of each pixel in a scene imaged in *M* bands as forming *M*-dimensional vectors. If we know that a pixel or small group belong to a feature of interest (such as erased undertext), then we can construct a *M*-dimensional 'reference' vector for this feature. Even in this *M*-dimensional space, the angle between any pair of vectors is one-dimensional and quite easily evaluated from the scalar product of the two vectors. In spectral angle mapping (SAM), the angle between the vector corresponding to each pixel in the scene and a 'reference' vector for a pixel known to belong to the feature of interest (e.g., erased text) is evaluated simply and very quickly from a simple trigonometric formula. The resulting gray-scale output image is rendered by converting the angle for each pixel to a proportional gray value—small angles are mapped to 'dark' output pixels and large angles to 'bright' pixels. The resulting gray-scale image depicts the spectral similarity of each pixel to that of the desired feature. It is important to note that the 'lightness' of the pixel has no effect on the output image—only the spectral angle determined from the *M*-dimensional vector is relevant. This last characteristic of SAM can be very useful for features such as erased text, which may be considerably 'lighter' than areas of dense ink but may still have a measurable spectrum.

An example of a SAM result from the eight fluorescence bands for Sin. ar. 514, f. 103r is shown in Figure 2(f). The result is very similar to that for ICA band 2 in Figure 2(d), but the process is much quicker to run.

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[7] Hyvarinen, Fast and robust fixed-point algorithms.

CONCLUSION

Image processing methods based on multiband statistics have proven to be useful for subtle characters in many of the image sets from palimpsests in the collection at St. Catherine's Monastery. The methods are still being refined and further improvements may be expected.

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Fig. 1: Visual appearance of f. 103r of Sin. ar. 514, which was used as the test object for the processing. The small section near the bottom outlined in red is the region where the processing methods are compared. The Spectralon® reference standards with 2%, 50%, and 98% broadband reflectivity are at the bottom of the image field, and the colour chart that is used only for calibrating the visible colour image is at the lower left of the image field
(© St. Catherine's Monastery, Sinai, Egypt)

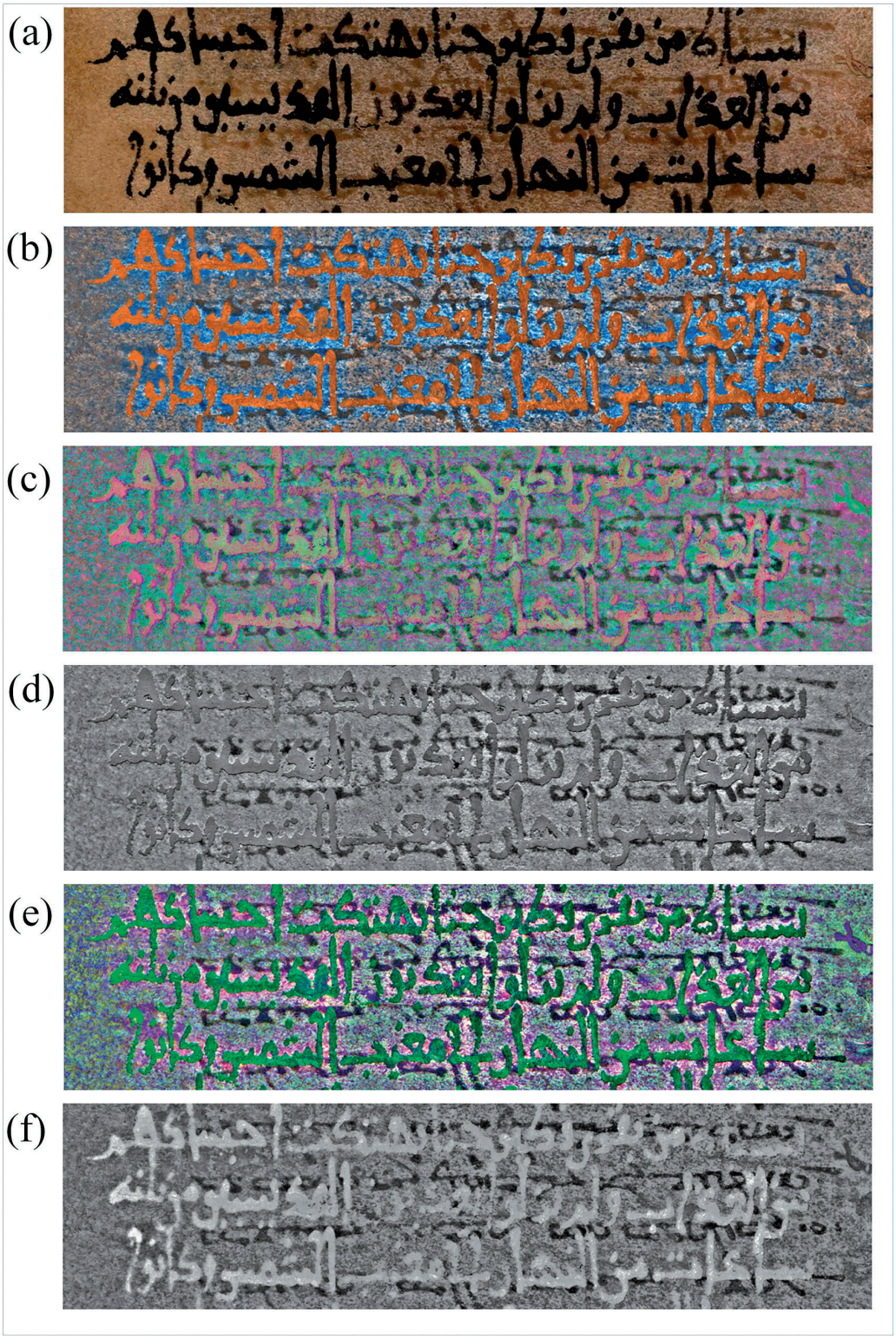

Fig. 2: Comparison of processing results of the small section of f. 103r of Sin. ar. 514. All processing is applied to the seven spectral fluorescence bands: (a) visual appearance, showing that some of the erased text is marginally legible; (b) pseudocolour PCA result, showing some interference from the coloured overtext; (c) pseudocolour MNF result, which shows the undertext in similar contrast to the PCA example, but the overtext has much less contrast; (d) ICA band 2, showing good contrast of the erased undertext; (e) pseudocolour ICA image, showing the colour contrast between the erased undertext and the overtext; (f) result of spectral angle mapping, where the gray value is 'dark' if the angle between the vectors for the image pixel and the reference undertext pixel is small. Note the significant contrast between the dark undertext and overtext and the 'crisp' edges of the undertext
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Leif Glaser

X-Ray Fluorescence Investigations on Iron Gall Ink Writing: Equipment and Geometry

INTRODUCTION

Iron gall ink, as the dominant writing material in Europe and the Middle East for the last two millennia, is of key interest when dealing with historic documents. If documents need to be placed within a historical frame of reference, context, hands, and languages used can be sufficient, but materials analysis may add conclusive information or confirm earlier assessments. In some cases, only modern methods of investigation allow for a definitive answer to a question. Among the methods predominantly used, X-ray fluorescence (XRF) spectroscopy is a versatile tool for analyzing metallic components in an object's surface and thin inhomogeneous films.[1] In the case of written documents, for XRF investigations the objects (a page at a time) can be assumed to consist entirely of a surface area. Due to an increasing variety of equipment in use and results presented, a better basis to work from in order to compare independent measurements is increasingly important.

This paper will present some factors that influence XRF results on iron gall ink measurements and will demonstrate how some of these can be utilized to explore specific questions. The equipment discussed will be limited to energy dispersive XRF, which is useful for elemental characterization of a sample. It will be noted that wavelength dispersive XRF systems can additionally identify the chemical environment of the metal, but require much longer times for the respective measurement, while chemical and compound information can also be obtained faster by Raman measurements. While some discrepancies in the XRF results are intrinsic to the differences in the systems used, some are simply of geometrical origin and affect each system. This paper will start by introducing the different general types of equipment available today and listing their key characteristics, while highlighting their intrinsic differences and impact on measurements. This section is then followed by a discussion of general geometric issues when dealing with thin film samples (such as inks) and which settings need to be documented. Not every object allows an identical approach. Even when using the same system on two similar objects, changes in geometry may influence the results. Finally, some remarks are made concerning standards and metadata. Since most historic documents are in less than perfect condition, transporting them to large-scale facilities for investigation is usually undesirable, so experiments are performed at the site where the object is kept. Due to the resulting importance of transportable equipment in dealing with cultural heritage, the focus of the paper is therefore on transportable equipment of this type. Moreover, specific treatment or sampling to optimize measurement is typically out of the question when measuring unique historic objects, and thus samples with untreated surfaces are presupposed here. All Monte Carlo calculations were done using the XMI-MSIM code,[2] which uses the Ebel model for the X-ray tube spectra.[3]

METHODS AND EQUIPMENT

To perform XRF measurements on iron gall ink writing, many different kinds of equipment can be used. There is a huge variety of handheld XRF (hXRF) systems that are all shaped handgun-like and can be used in point and shoot mode, mounted on tripods, or attached to desktop chambers. These hXRF scanners have been primarily developed for quality control in metal production, geological probing,[4] and screening for toxic ele-

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1 Markowicz *et al.*, Method; Sitko, Quantitative X-ray fluorescence analysis.

2 Schoonjans *et al.*, Monte-Carlo Simulation.

3 Ebel, Tube spectra.

4 Norrish and Hutton, An accurate x-ray spectrographic method; Potts and Webb, X-ray fluorescence spectrometry; Rowe *et al.*, The

ments. The systems are optimized for their main purpose—e.g. trace element detection in a metallic matrix, soil, or rock sample. In the last decade, several companies have adjusted their tools for use in cultural heritage investigations, but the workhorse application driving the developments remains unchanged. Primary uses of these hXRF spectrometers are in general field tests and pilot surveys. The second group of XRF equipment comprises laboratory systems that are mainly benchtop machines and have a much more diverse primary use than the handheld spectrometers. There are several systems on the market that have been optimized or even specifically built for cultural heritage investigations, after the usefulness of the technique had been demonstrated in a srXRF test case.[5] These spectrometers are primarily used for, and for most samples and questions they give high quality results, while they are still transportable enough to be relocated to objects that cannot be transported themselves. The last group of XRF 'systems' are large-scale facilities. They either deliver ion beams (for particle induced X-ray emission: PIXE[6]) or X-ray beams (synchrotron radiation XRF: srXRF). These methods allow high-resolution, high-quality analysis of material with the lowest detection limit for a non-invasive technique,[7] but they cannot be moved to an object. There are many similarities between the first two groups of systems compared with the third, as shown in Table 1. The differences between hXRF (1) and lab-XRF (2) appear rather subtle, but in some cases are significant when comparing results.

	(1) Handheld	(2) Benchtop	(3) Large-scale facility
Spot size	1–8 mm	30 µm–1 mm	10 nm–1 mm
Flux	10^6–10^7 ph/s	10^7–10^9 ph/s	10^{10}–10^{14} ph/s
Detector area	6–50 mm²	50–120 mm²	variable
Photon source	X-ray tube	X-ray tube	Undulator
Photons	Poly-chromatic	Poly-chromatic	Monochromatic
Filters	optional	standard	Not needed
Sample environment	Air	Air/Helium/Vacuum	Air/Helium/Vacuum
Weight	1.5–3.0 kg	50–500 kg	>> 30 000 t
Mobility	Mobile	Transportable	Stationary
Retail price	20–80 k€	80–300 k€	200–500 M€
Price per 10^6 ph/s	8000–20 000 €	3000–8000 €	1–2 €

Tab. 1: Three different groups of XRF systems: Handheld, benchtop, and large-scale facilities. The parameters listed give some idea of the size, price, and performance of the systems.

The most significant difference between today's X-ray lab equipment and large-scale facilities is the source of the X-rays. While any lab equipment uses some sort of an X-ray tube with variable anode material, large-scale facilities use magnetic fields and electron beams to produce X-rays. The spectra produced by Undulator and X-ray tube are very different. Undulator radiation is monochromatic and can be tuned to a desired energy in the operation range of the undulator (e.g. 6 keV to 60 keV).[8] Undulator radiation[9] is usually linear polarized and thus allows specific geometries, where the background for XRF measurements is especially low. X-ray tube radiation (Fig. 1+2), on the other hand, has a broad energy spectrum and consists of two main contributions: a continuous acceleration voltage-depending Bremsstrahlungs-spectrum, and an anode material-depending characteristic line spectrum. The radiation is unpolarized and intrinsically poly-chromatic, while filters can easily be applied with moderate flux reduction (Fig. 1+2) to reduce unwanted radiation; a post source polari-

quantification.

5 Dik *et al.*, Visualization; Bergmann, Imaging.

6 For the scope of this paper, PIXE is concidered a monochromatically excited storage ring based XRF method primarily for light metals.

7 'Non-invasive technique' is defined in this context as a method that requires neither sampling (not even micro sampling) nor any physical contact with the object, while also not measurably changing or damaging the object due to the investigation.

8 Due to the tunability and monochromaticity of the photon energy of undulator radiation, there is no need for filter foils, except sometimes for a different function as absorbers for flux reduction.

9 Margaritondo, Synchrotron Light.

zation reduces the flux one to two orders of magnitude. The spectrum of a typical X-ray tube has a significant (30%–50%) contribution in the energy range below the iron K edge, which reduces the effective flux that is useful for iron gall ink investigations by almost this amount. Additionally, the lower energy part of the X-ray spectrum is more strongly absorbed by the parchment and thus slightly more harmful to the document investigated.[10] The most common solution to this is the use of a filter to absorb the low energy part of the spectrum. In the case of iron gall ink measurements, aluminum (Fig. 1+2) is the best suited filter material, as aluminum is cheap to produce in any thin foil thickness and most effective in suppressing only the low energy side of the spectrum (X-ray attenuation length taken from NIST database[11]).

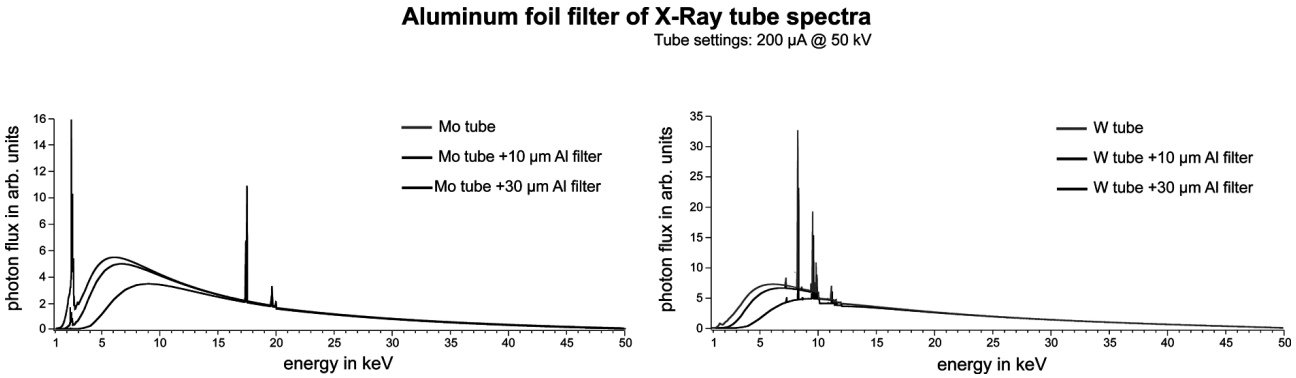

Fig. 1: The spectra of an X-ray tube with an anode material of molybdenum (left) and tungsten (right) and the effect of a 10 µm and 30 µm aluminum filter on the two spectra.

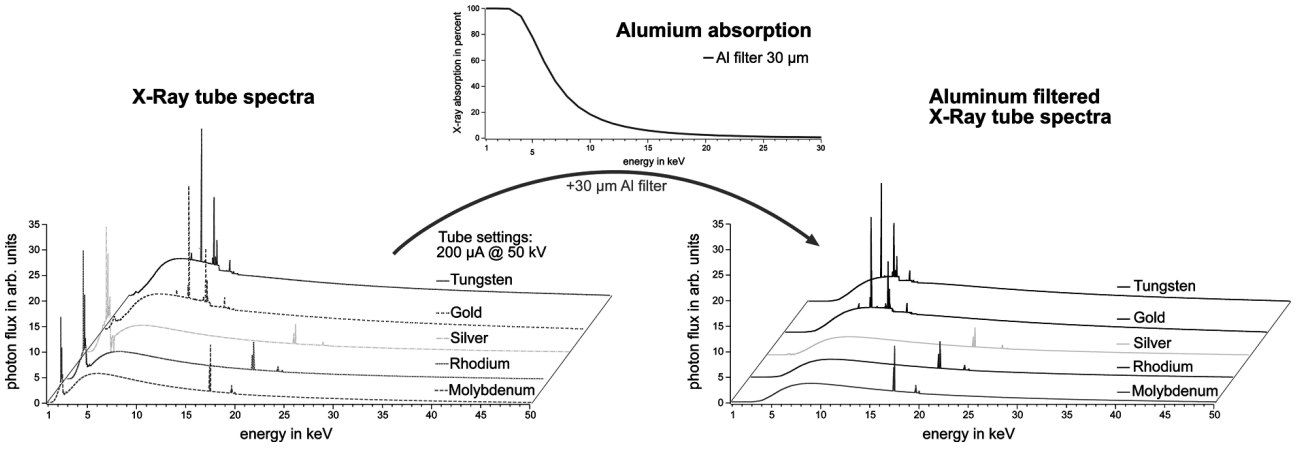

Fig. 2: A spectral overview of the 5 most common X-ray tube anode materials is shown on the left. The tubes setting is in the order of a typical setting for a handheld XRF device. The energy dependence of the absorption for aluminum is shown top center. On the right side the spectra from the left have been filtered with a 30 µm aluminum filter.

The X-ray tubes can be operated at different acceleration voltages and different anode currents. These settings change the shape of the produced spectrum: while the anode current predominantly changes the intensity (flux) of the tube, the acceleration voltage influences the shape of the spectrum. As shown in Figure 3 (left) an

[10] Young, *Effect*.
[11] henke; NIST.

X-ray tube with tungsten anode material is varied only at the anode current while keeping the acceleration voltage fixed at 50 kV: the intensity of the spectrum increases while the relative percentage of the entire spectrum that is e.g. below the iron absorption edge (7.112 keV) stays constant at 23%. Likewise, the spectral center of gravity[12] stays constant at 12.2 keV. Changing the anode current is therefore a safe option that can be adjusted if necessary, while performing a set of measurements. Any change of the anode current will thus influence only the time duration for the measurements, but not any relative intensities within the measured XRF data. The opposite is true when the acceleration voltage is changed, as shown in Figure 3 (middle and right), while the anode current is fixed at 500µA: the shape of the spectrum changes with the acceleration voltage, consequently the relative amount of the respective spectra above the iron absorption edge ranges from 57% at 20 kV acceleration voltage to 87% at 80 kV. In the same way the spectral center of gravity shifts from 7.9 keV at 20 kV to 18.1 keV at 80 kV. This holds true to a different extent for every absorption edge in the energy range of the X-ray tube's spectrum. Any change of the acceleration voltage within a series of measurements will affect the relative amount of the elements detected. If this tube is to be used to measure an historic document to e.g. identify an iron gall ink metallic fingerprint,[13] an acceleration voltage of at least 50 kV is advisable in order to have sufficient flux at the iron, copper, zinc and lead edges.

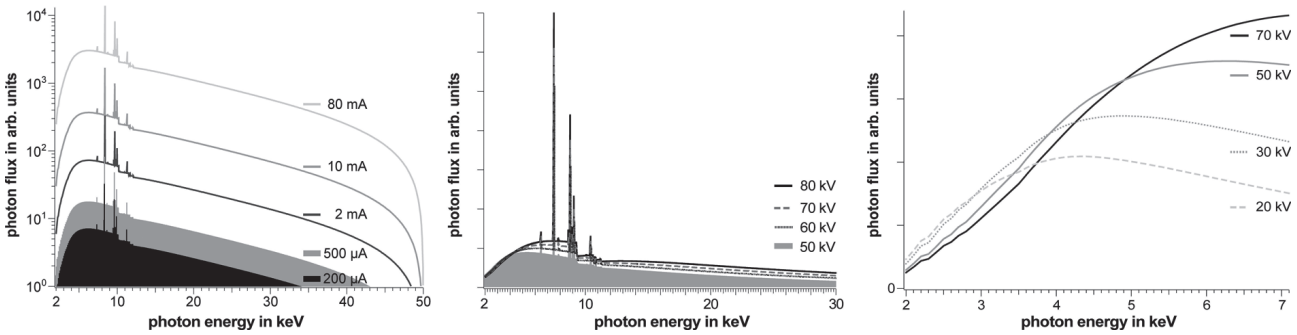

Fig. 3: The effect of varying the anode current on a tungsten X-ray tube with fixed acceleration voltage of 50 kV (left) is simply the increase of flux. When keeping the anode current fixed, but varying the acceleration voltage (middle and right), the shape and thus spectral center of gravity changes. The higher the acceleration voltage, the harder the mean X-rays emitted from the tube.

Obviously changing between two tubes with different anode materials can have significant effects on the resulting data too. For the same iron gall ink, the characteristic metallic fingerprint of the ink may appear differently. Take molybdenum and tungsten as popular anode materials (Fig. 1): while the characteristic lines of molybdenum are above all absorption edges that usually appear in an iron gall ink, tungsten's most intensive characteristic line (W Lα @ 8.4 keV) is below the copper (9.0 keV), zinc (9.7 keV), and lead absorption edges (up to 15.2 keV). Hence an ink fingerprint determined with a molybdenum and a tungsten anode tube system will differ: if the measurement with the tungsten tube would lead to relative amounts in respect to iron of e.g. 9% Ca, 71% Cu and 5% Zn, the same ink could show 10% Ca, 73% Cu and 5% Zn with a molybdenum tube of otherwise identical settings (50 kV / 0.2mA / no filter), if no compensation is done. The mathematical relation between two different fingerprints measured of the same sample of element X in respect to iron is:

$$\frac{X_2}{Fe_2} = \left(\frac{X_1}{Fe_1}\right) \cdot \left(\frac{I_{(X_2)}}{I_{(X_1)}}\right) \cdot \left(\frac{I_{(Fe_1)}}{I_{(Fe_2)}}\right)$$

[12] I.e. energy value where half of the delivered photons in the spectrum are above and half of them are below the energy.
[13] Malzer *et al.*, A fingerprint; Hahn *et al*., Iron-gall inks.

Where X_2/Fe_2 is the element X to iron ratio of the second measurement, X_1/Fe_1 that from the first measurement, while $I(Fe_1)$, $I(Fe_2)$, $I(X_1)$ and $I(X_2)$ are the spectral flux contributions above the absorption edge of the elements Iron and X of tubes 1 and 2. The effects of changes in the spectra due to anode material, acceleration voltage, and filters can be cumulative. While for ink fingerprint analysis, comparable results can be expected if molybdenum, rhodium, or silver tubes are used, while gold and tungsten may over- or under-represent a trace element relative to measurements with the other three anode materials. Companies use calibration curves for their systems to compensate for these effects, but they usually do not share them with the customer. What is more, most cultural heritage samples do not strictly meet an industrial standard, hence a margin for error remains. A systematic comparison of different systems and different tube settings on clearly-defined reference samples is highly recommendable. In spite of any compensation effort, lines corresponding to the characteristic X-ray lines of the anode material remain present in the measured data. If the anode is made out of a standard material such as, e.g., molybdenum, rhodium, or tungsten, it is easy to correct for these measurement artefacts simply by ignoring them when dealing with cultural heritage objects. All three metals were discovered between 1778 and 1803 and should not show up in any measurement of historic objects. These metals are very uncommon impurities in historic material and were not deliberately used for cultural heritage objects after their discovery. Two other common anode materials for X-ray tubes are silver and gold and inherently not favorable for cultural heritage investigation systems. Both metals were widely used in art and illustrations for several thousand years and will show up regularly when measuring historic material, although neither metal is present in any iron gall ink.

Measurements from a large-scale facility are more easily used as reference, due to the monochromatic, polarized nature of the X-rays used.[14] There is only one energy present, and if that is given, the energy-dependent absorption cross-section for each detected element can be looked up (NIST). This way, results achieved at different excitation energies can be compared. For an exact comparison between measurements from tube-based systems and large-scale facilities the measurement of an identical standard with both approaches is best.[15]

MEASUREMENT AND SAMPLE GEOMETRY

A lot of the systems on the market are sold without exact information on their performance, as e.g. the actual photon flux is often considered a company secret, hence a comparison of advertised systems of different companies is difficult.[16] Nevertheless, there are several general effects on the sample investigation that will be discussed here first: the angle of incidence and angle of detection, as well as the spot size, all in relationship to the key feature of interest, may severely affect the results obtained. The simplest effect is the angle of incidence, which has less influence for solid materials, but changes the interaction length with thin films geometrically (Fig. 4):

$$I_l = d/sin\,(\alpha)$$

Where d is the thickness of the material, α the angle of incidence (90° as incidence normal to the surface), and I_l the interaction length in the material. Changing the angle of incidence, while keeping the detector at a fixed position, can be used to determine the thickness of a layer or the existence of a layered system in the first place. While a homogeneous object will appear the same at different illumination angles, the elements from a coating or surface layer will appear to be twice as abundant under 30° incidence than under 90°. A more grazing incidence will in the same way elongate the X-ray footprint on the investigated surface and thus increase the spot size in that direction. An increased spot size has a limiting effect on the maximal lateral resolution achievable. The spot size can alsohave a distinctive effect on the measurement itself, as the size relative to the region of interest is the main variable (Fig. 5).

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[14] Glaser and Deckers, Basics.

[15] Chen *et al.*, High Definition.

[16] The flux listed in Table 1 for the different groups of XRF systems is not from the companies selling the systems, but from companies producing the X-ray tubes that are usually installed in those systems.

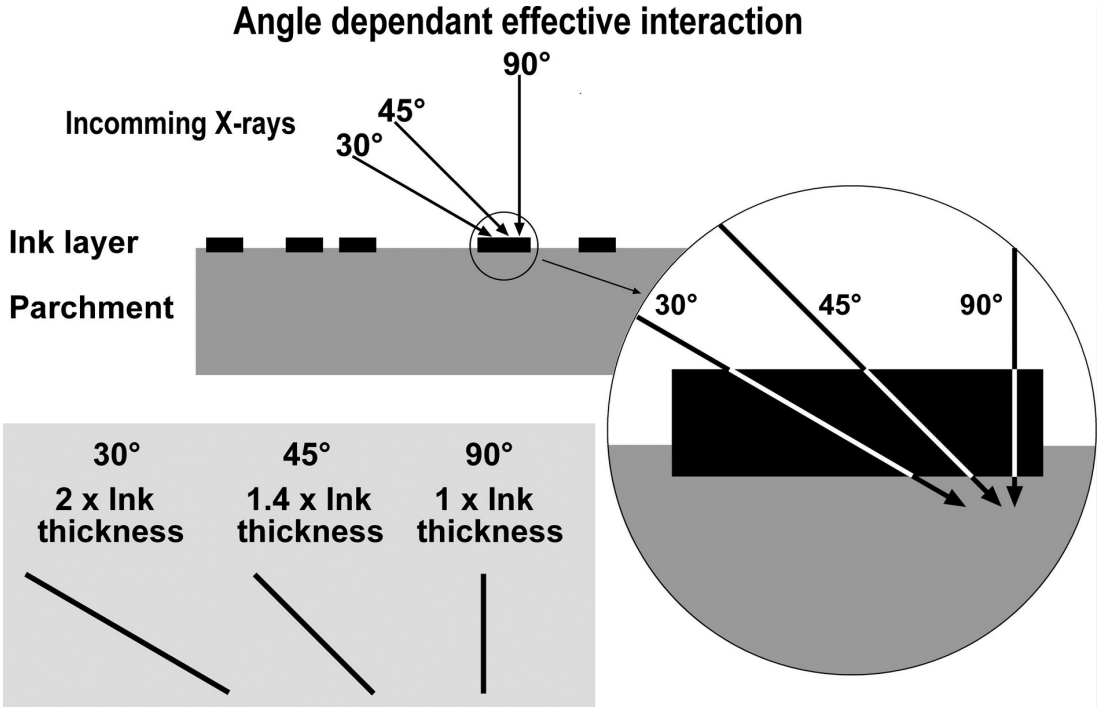

Fig. 4: The angle dependent interaction length is simply a geometric effect. The more grazing the incidence of the photons is, the longer the effective interaction length with the ink. By the same measure, the X-ray footprint on the object is increased and the potential lateral resolution decreases.

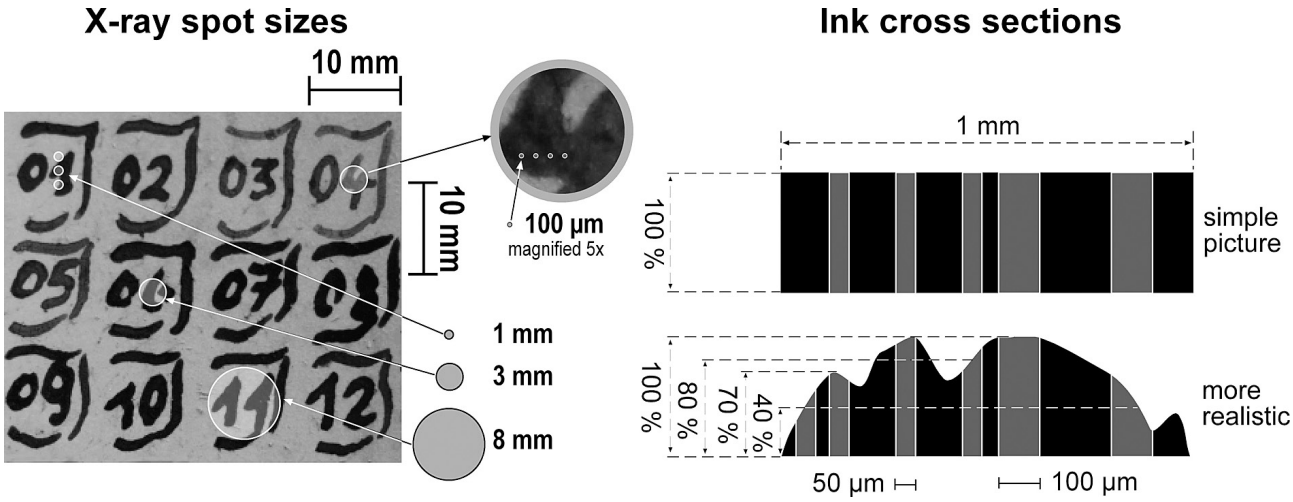

Fig. 5: Left: Reference object with 12 different iron gall inks and typical spot sizes used with hXRF systems (1–8 mm). — Top center: A 5x magnified section of the ink reference page to visualize the spotsize of typical benchtop XRF systems. These spot sizes are also commonly available at large-scale facilities. — Right: A uniform thick ink (top) and an ink of varying thickness (bottom) with the spot size dependent relative amount of ink measured.

An XRF signal from a homogeneous sample is constant in respect to spot size changes, as it was constant in respect to the angle of illumination. For the iron gall ink 11 (Fig. 5+6) on parchment the characteristic metallic fingerprint is to be examined.

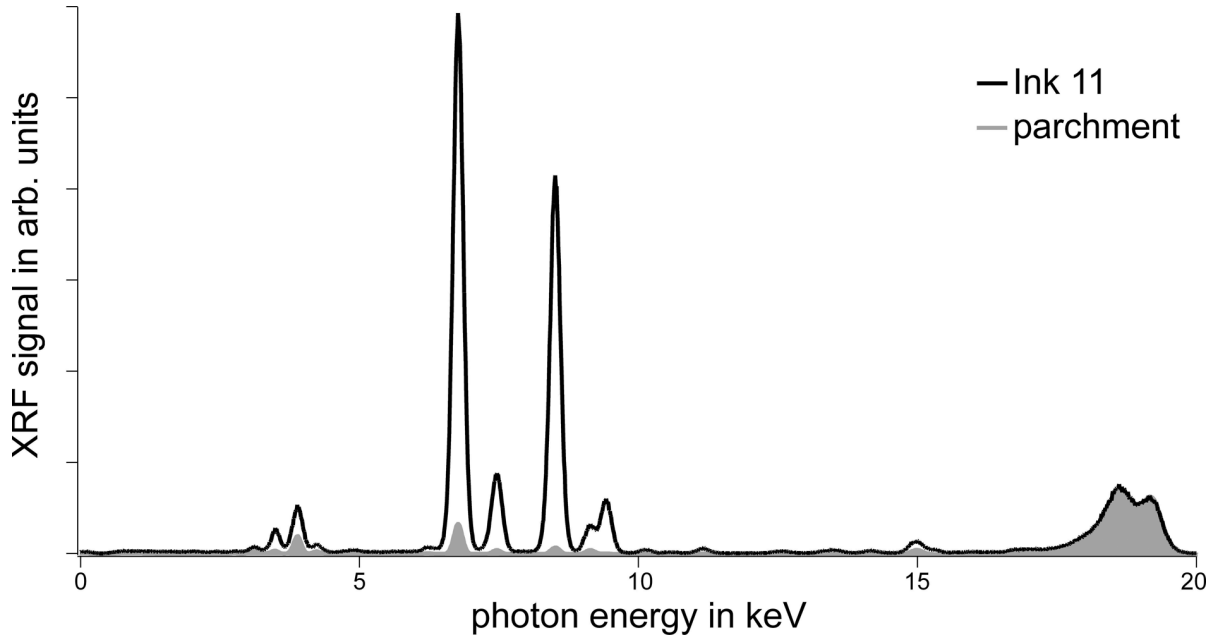

Fig. 6: The spectrum of the ink 11 and the parchment measured at a storage ring facility with 18 keV monochromatic X-rays.

If the spot size is large in respect to the region of interest, the measurement is a mean value of feature and background as e.g. the 8 mm spot will measure 60–80% just parchment (Tab. 2).

	Ca / Fe	Cu / Fe	Zn / Fe	Pb / Fe
Ink 11	0.09	0.71	0.05	0.01
Parchment	0.57	0.26	0.15	0.07
Ink 11 (80%) + parchment (20%)	0.10	0.70	0.05	0.01
Ink 11 (40%) + parchment (60%)	0.12	0.68	0.06	0.02
Ink 11 (20%) + parchment (80%)	0.17	0.63	0.07	0.02

Tab. 2: Metallic fingerprints derived from ink and parchment measurement and how that changes, when due to larger beams some areas are measured for the ink's metallic fingerprint where no ink is present.

With a smaller spot in the order of the region of interest, as e.g. the 3 mm spot being almost the size of the character, the measurement contains more ink, but still at least 20% parchment. The moment the spot size is in the order of the character line width (or smaller), the measurement is mainly or entirely of ink. This of course depends on the precision of the instrument to measure the region of interest as chosen.[17] The practical approach to avoid imprecision in alignment (even for better-adjustable devices) is to make small line scans across an ink's stroke. A second, usually unspoken, assumption is that the ink is very evenly spread within a stoke. This is of course a simplistic view, since the amount of ink on a quill is reduced in the writing process and thus the line thickness is continuously getting thinner until the quill is dipped into the ink again. The ink's cross-section is also not homogeneous at each given point, disappearing instantly at the edges (Fig. 5 top right), but has a variable cross-section. Ideally the ink thickness should be determined at each point of the measurement. This

[17] The hXRF instuments are rather hard to position exactly, while laboratory systems often have a microscope attached which helps to position the X-ray's field of view very precisely on a location on the sample.

is very unrealistic, since it would be too time consuming to remeasure each point inspected with XRF with a 3D microscope and attribute the right ink thickness to each measured point. A possible option for a potential intrinsic calibration of the measurement and to gain additional information on the ink thickness is to use the X-ray fluorescence lines' self absorption effects. Due to the slight energetic difference of the two emitted characteristic lines of iron, the lower energetic line (Fe Kα) is more strongly absorbed by the ink than the energetically higher line (Fe Kβ). The evaluation of the ratio of the two different lines makes it possible to determine thickness of the ink from which the X-rays were emitted. A Monte Carlo simulation with the XMI-MSIM code was performed: 17keV incoming monochromatic polarized X-rays hit an iron foil of varying thickness placed under 45°. The 300 µm thick silicon drift detector (SDD) was placed at 90° to the incoming beam in the plane of polarization and likewise at 45° to the thin film surface normal. The spectra analysis shows that there is an almost linear relationship for the iron peak ratio (Kα/Kβ) in thin iron foils of 0 to 10 µm.

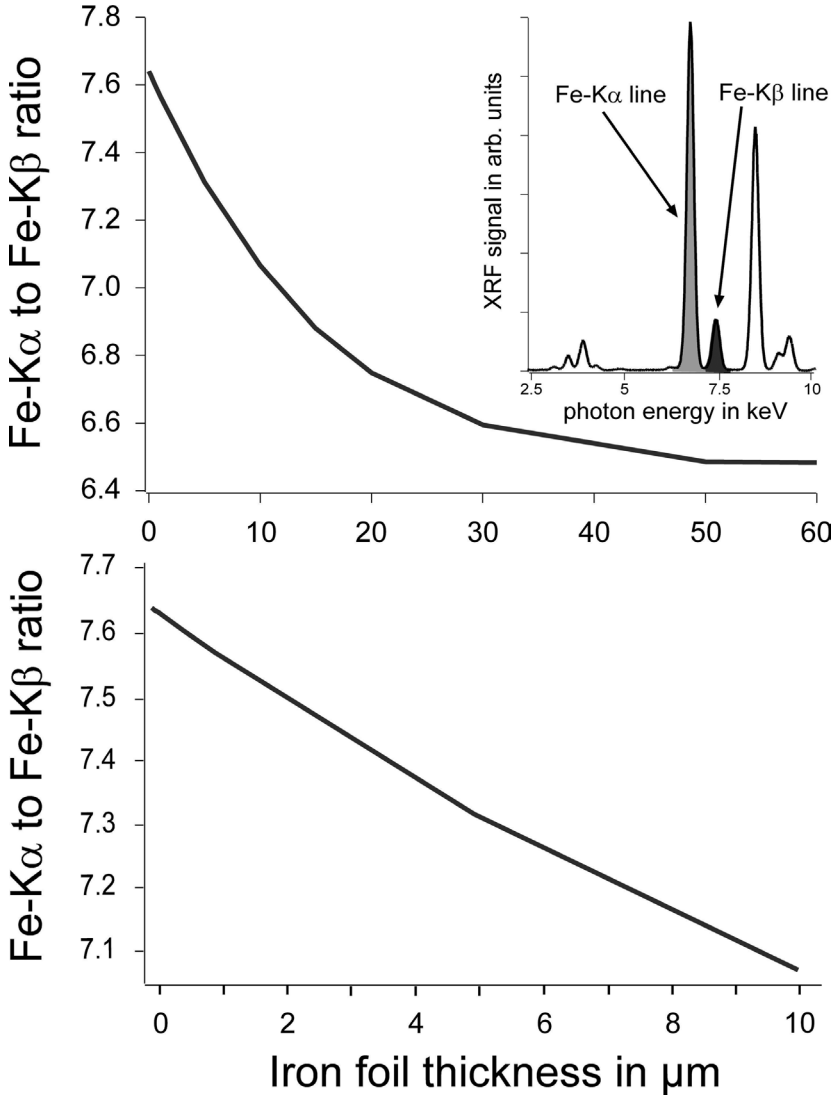

Fig. 7: The ratio of the two iron K-lines for thin iron films from 0 to 60 µm (top) and 0 to 10 µm (bottom). This ratio can be used as intrinsic thickness calibration.

Fe foil in µm	Fe-Kα Fe-Kβ	Estimated thickness of iron gall ink in µm
0.001	7.64	0.014
0.01	7.64	0.14
0.05	7.64	0.7
0.1	7.63	1.4
0.5	7.60	7
1	7.57	14
5	7.31	70
10	7.07	140
15	6.88	210
20	6.75	280
30	6.60	420
50	6.49	700
100	6.47	1400
1000	6.47	14000

Tab. 3: Iron K-line peak ratio for thin iron films and the estimated thicknesses of iron gall ink that generates the same iron peak ratio in an XRF measurement.

With the black color of iron gall inks being a complex of Gallic acid and iron, the amount of iron is of course much less per thickness in ink than in an iron foil. Going through the numbers: 0,001 µm (1nm) is roughly three times the diameter of an iron atom. There are 28 atoms (hydrogen not counted) in an iron-tannin complex,[18] of which there are 2 iron atoms. As a first rough estimate, there is one iron layer for every 14 layers of the ink. At least 200 nm are needed for any system to be optically active, which corresponds to about 600–700 layers of bcc iron. Assuming significantly less density for ink than bcc iron, it might be some 200–300 layers of ink, and thus compare to 20 layers (1/14) of iron foil as calculated. This would correspond to 6 nm of thin film (Fe Kα to Fe Kβ ratio = 7.64). A reasonable iron gall ink thickness of 35 µm[19] corresponds to a 1 µm thin iron film (Fe Kβ to Fe Kα ratio = 7.57). The differences are subtle but distinct and due to noise in real systems the measuring time per point may become too long to use this approach as calibration method for each point. If the statistic for each point is insufficient, but enough points are measured on a document, a sum spectrum of all points measured can be generated and an average ink thickness determined. This mean value may help to cluster documents statistically. Changing the measuring geometry can be helpful if specific questions are addressed, as e.g. the thickness of a surface layer as discussed above. For the same reason, the measuring geometry should always be documented alongside the published results.

COMPARING DATA AND METADATA

Keeping a fixed setting (e.g. spot size, tube settings, etc.) in a laboratory environment is a safe option for operating in a closed environment to compare different samples measured there on a relative scale. Any comparison of results achieved under different operation conditions (e.g. other hardwaresettings, different type of system) will lead to uncertainties, as discussed above. As the number of investigated objects in the field of cultural heritage, including written documents, will increase significantly in the next decade, often more than one method will be applied to each investigated object, and not necessarily under exactly the same conditions. The more and specific information (metadata) about published investigations are available, the better it will be as a basis for future comparison and the cultural heritage community. In several fields, where extremely large amounts of data are produced, as in the storage ring facility community, workshops are held to discuss the best

[18] Krekel, *Chemische Untersuchungen.*
[19] Liu and Strlič, Kinetics.

way to handle and store metadata.[20] In the cultural heritage community, the need for this is significantly less pressing, but some guidelines should nevertheless be discussed here. It is important for any follow-up investigations that data already gathered relating to a specific object or reference material becomes and remains useful after the data has been published. Hence, alongside basic fundamental details, such as the type of system used, the entire settings list should be included: X-ray tube anode material, acceleration voltage, anode current, spot size, angle of incidence, angle of detection, distance to the object, support material, (if used) filter material and thickness, ideally even an X-ray spectrum of the source. Additionally, if used, helium flow or cryojets should always be mentioned. The software (including the version) used for evaluation should also be included. For better comparison of different results of different groups and spectrometers, measuring a standard reference material would be desirable. In the case of iron gall ink, a set of pure systems of the three main metallic 'ingredients' would be desirable, as $FeSO_4$, $CuSO_4$ and $ZnSO_4$ are not restricted chemicals and can be handled with no danger to the experimenter. Using 5g of each compound in 50ml of a saturated solution of Gallic acid in water will produce tinctures, which have reasonably similar amounts of metals to iron gall inks. A mixture of the three in e.g. equal parts applied to easily-available standardized paper such as whatman No1 would be a reference everyone can make and reproduce at any time, if needed. Only data published with sufficient information will benefit the cultural heritage community.

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[20] Grunzke *et al.*, Metadata Management; lsdma.

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Irmgard Schuler

Imaging as a Diagnostic Tool for Manuscript Inspection

The primary task of the Photographic Department of the Vatican Apostolic Library is the production of photographic reproductions of the Library's materials, for the research and publication purposes of scholars and users, and for the enrichment and completion of its own archive. As a part of this, for the last ten years, the Photographic Department has managed, monitored, and verified all the photographic processes involved in the large-scale digital preservation project aimed at reproducing and then disseminating online the entire manuscript collection held by the Library. The history of photographic reproduction in the Vatican Library dates back to the mid-19th century, and over the course of those years photography itself has changed and developed enormously, one of the most significant changes being the move from analogue to digital technology. Additionally, since the laboratory was instituted in its official form in 1938, it has been developing experimental activities using X-rays as well as ultraviolet and infrared radiation. Now, multispectral digital technologies have been in use for about a decade. Without harming the originals, these allow for important and sometimes decisive breakthroughs in understanding of both the content of a manuscript and its conservation state. The results which follow are the fruits of the Laboratory's activities from 2015–2017.

Many previously illegible texts have been detected optically: The Barb. lat. 4076,[1] a codex whose text was partially unreadable due to fading ink, has been recovered by ultraviolet fluorescence imaging. In the manuscript Ferr. 841 in which the text on the verso of the end flyleaf had transmigrated, by impression, onto the back pastedown, the text has been reconstructed thanks to ultraviolet imaging of both pages, followed by enhancing its readability through mirroring it onto its original page.

In other cases, discovery took place unintentionally, such as in Reg. lat. 1290, a palimpsest photographed in ultraviolet fluorescence that revealed not only the undertext, but whose drawings, present on some of the folios, were emphasized by fluorescence, allowing a better decryption of both the hidden text and the decoration.

In the codex Urb. lat. 13, the application of a green filter[2] when photographing with a camera modified for shooting in the infrared spectrum made it possible to increase contrast and to obtain better legibility of the illumination around the coat of arms as well as a better reconstruction of the writing that began to fade in the other shots which used longer wavelengths in the infrared spectrum. In any case, we are still continuing to encounter problems when focusing in the infrared spectrum. This is due to different indices of light refraction in optical filters particularly in those wavelengths, and the fact that lenses have been manufactured and enhanced for photography in the visible spectrum.[3]

In another case, a blazon in an early printed paper book had been covered by gluing a new one, also designed on paper, over it. Even though long wavelengths penetrate best through material, infrared reflectography did not make it possible to image the original drawing through the superimposed layer. Two different attempts to access the older design were made: one using reflectography with a camera equipped with an InGaAs (*indium gallium arsenide*) sensor, an infrared detector which is sensitive to wavelengths from 1200 up to ca. 1700 nm; the other using thermography, which detects radiation in the long-infrared range (in our case, in the spectral region of 3000–5000 nm). We were successful with the InGaAs detector, whose radiation was sufficient to

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[1] This manuscript is the well-known autograph of the 'Documenti d'Amore' by Francesco da Barberino, and unfortunately the text (and, partially, also the decoration) have been damaged due to the detachment of the ink and pigment.

[2] Wratten 61, which blocks a great part of the visible light (cutting at 600 nm) in IR photography and consequently emphasizes the effects of imaging at infrared frequencies, while partially maintaining the advantages of illumination through visible light. The use of photographic filters during shooting, if done with awareness, is normally preferable—or, at least, we may say that it is complementary—to digital post-processing of the acquired images.

[3] For the performance of photocameras with removed anti-aliasing filter, see Melis *et al.*, Variante Full Range su fotocamere Nikon.

reveal the original blazon under the current one.[4]

An aspect that is often neglected is the physical condition of the parchment or paper containing the text to be read or illustration to be deciphered. In photography, trans-illumination and innovative three-dimensional technologies are becoming of increasing interest[5] because they are possible ways of investigating the materiality and the conservation state of a writing support in order to get better access to the text. In this context, the simple technique of raking light that provides low incidence angle illumination is also sometimes the best way to obtain more information on the surface structure of the manuscript. A detail of the *canzone* 'Poi ch'ad Amore piace', preserved in the Canzoniere Vaticano Vat. lat. 3793, f. 101r, is illegible because of a stain caused by moisture. An image shot with ultraviolet fluorescence and ulterior image processing in Camera RAW gave access to the physical residues of the text; but the text could nevertheless not be fully recovered with absolute certainty. Subsequent imaging with raking light revealed, in addition to the water damage, an injury to the parchment and its slight roughening, perhaps due to scraping at that point. Both images could be used by scholars for the reconstruction of the text as well as of the history of the support on which the text was written and which permitted its transmission through the centuries.[6]

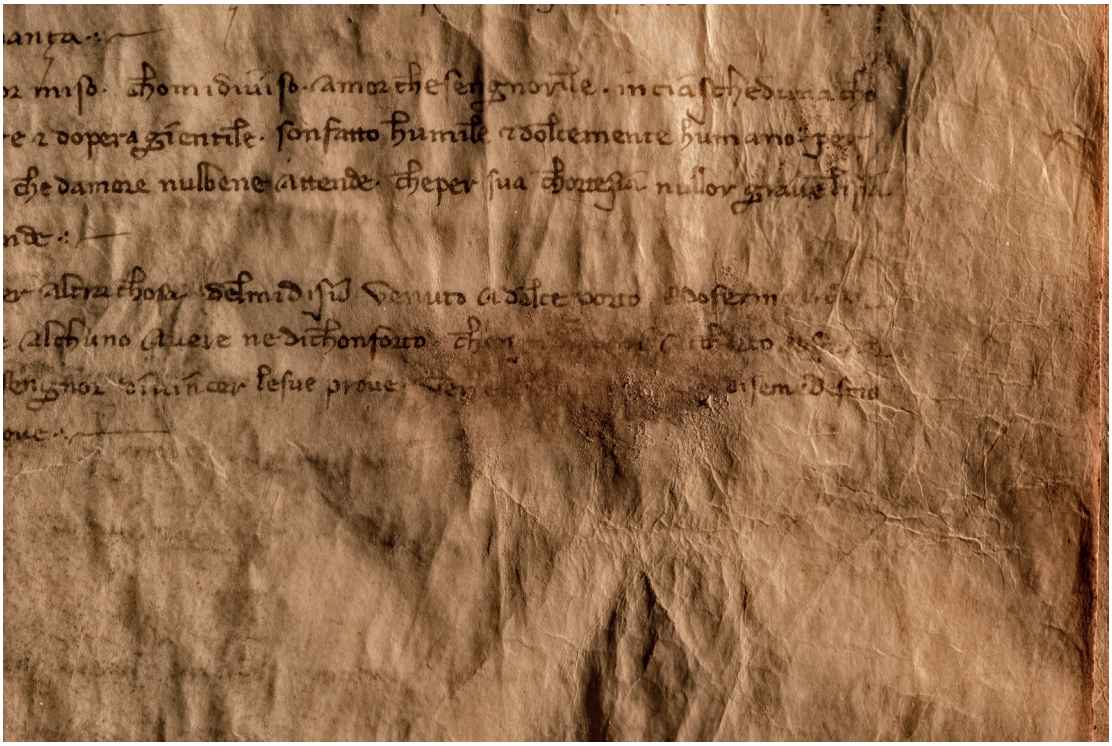

Fig. 1: Vatican Apostolic Library, Vat. lat. 3793, f. 101r (detail shot with raking light)
(© Vatican Apostolic Library)

[4] Generally, the best results with an InGaAs detector are obtained in materials that make it possible to overcome the interference of iron gall ink (which becomes transparent at those wavelengths), or when the purpose is to highlight transparent elements under the ink (i. e. watermarks). However, in order to recover deeper layers in an object, sometimes (especially in parts without written text) the best technique may be thermal imaging, which generally makes it possible to reveal elements complementary to those detectable by InGaAs technology. Both technologies require an experimental approach and do not always guarantee acceptable quality of the visualization of the elements being investigated (the results depend on the type of material, its conservation state, and possible interference from other components present in the manuscript).

[5] The most common three-dimensional technologies for cultural heritage objects are Reflectance Transformation Imaging (RTI) and Photogrammetry, both techniques that are cultivated and taught, for example, by the Cultural Heritage Imaging Corporation, see http://culturalheritageimaging.org/ (accessed 01.07.2023).

[6] The manuscript Vaticanus latinus 3793 is the earliest, as well as the only independent, testimony, to the full work of the so-called *Amico di Dante*. In the 16th-century copy of Vat. lat. 3793 made by Angelo Colocci (conserved in Vat. lat. 4823), the *canzone* 'Poi ch'ad Amore piace' appears on ff. 301r–302r, already showing the lacuna at verse 58. Michele Rinaldi, *pers. comm.*, 29 March 2018.

A specific question arose during the detection of watermarks, which is performed using a mixed technique that uses trans-illumination and photographic capture with infrared radiation: which is the correct side of the watermark? When the right and the left sides of the watermark design are symmetrical but differ slightly, it is necessary to ascertain what the original watermark design was. The fact is that the correct side is the one where wire and chain lines are less visible in raking light (and where the imprint-relief of the metal of the watermark is more visible and transparent). Thus, the answer lies again in the photographic technique of raking light shooting, which allows the identification of the proper orientation of the paper sheet.

Let me now showcase a special imaging project centred on the Papyrus of Hanna, one of the oldest surviving witnesses of the text of the New Testament, containing the Gospels of Luke and John.[7] It is the most ancient complete manuscript in the Vatican Library (only some fragments are older),[8] written between AD 180 and 220, and probably one of the most precious. Immediately after it was donated to the Holy See in 2006,[9] the fifty-four pieces were photographed using 5" × 7" colour positive sheet film, unfortunately without taking the necessary precautions to prevent the formation of shadows around the edges of the papyrus fragments, which are conserved between glass plates. Errors during the developing process then produced transparencies that show an excessive blue dominance. The transfer from these ektachromes to digital format added noise to the images, and due to this and other problems related to the shadows and the lack of correct colour correspondence, the files became almost unusable for research purposes.

The new imaging project in 2015 had to produce images that could replace the originals for study and research and at the same time could be stored according to our quality standards for long-term digital preservation.[10] High resolution 800 ppi RGB-images were therefore captured with a *Metis* scanner. In order to avoid the insidious problem of shadowing during the imaging process, a light box was put under the glass plates containing the papyrus fragments. As a result of these measures, it was possible to capture exceptionally high resolution and well-defined RGB files,[11] in addition to three-dimensional images obtained through several captures of the same original with different light settings, and three-dimensional processing of these RAW-files via the *Metis* scanner software. The *Light Inspector* software (implemented in the scanner's acquiring software) calculates information related to the incidence of light over the object directly from the captured 2D colour data.[12] It is an interactive and intuitive research tool that previews the manipulations made by the user in real time on the screen, permitting the export of these results in conventional TIF format.[13] Valuable information regarding the surface structure and the materiality of the papyrus can be obtained by observing and studying these three-dimensional images.

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[7] See Janz, Per una edizione facsimilare del papiro Bodmer XIV–XV, where the author, amongst other things, illustrates the interesting work of reorganization and virtual alignment performed on some fragments in order to reconstruct the text. See also the *editio princeps* of the papyrus codex of 1961: Martin and Kasser, *Papyrus Bodmer XIV*; Martin and Kasser, *Papyrus Bodmer XV.*

[8] Ambrogio M. Piazzoni, *pers. comm*., 1. March 2018.

[9] See an article describing the donation of the papyrus: Spiteri, His eminence, cardinal Raffaele Farina, SDB, and the papyrus Bodmer XIV–XV.

[10] Regarding the Vatican Library's policy of long-term digital preservation of its electronic image data, see https://www.vaticanlibrary.va/en/the-digital-project.html (accessed 01.07.2023).

[11] These VIS images (at lower resolution and provided with an electronic watermark) are available in the Vatican Apostolic Library's digital library: https://digi.vatlib.it/view/MSS_Pap.Hanna.1(Mater.Verbi) (accessed 01.07.2023).

[12] The latest version of the software makes it possible to map the real heights of the reliefs of an original, to remove specular reflections on glossy originals, and to merge images. However, it is worth considering that this kind of three-dimensional imaging remains a representation of the object—an interpretation that is not, at the present state of the art of the technology, a virtual copy.

[13] Information about acquiring devices, software and special features distributed by the *Metis Systems* company are available at https://www.metis-group.com/ (accessed 01.07.2023).

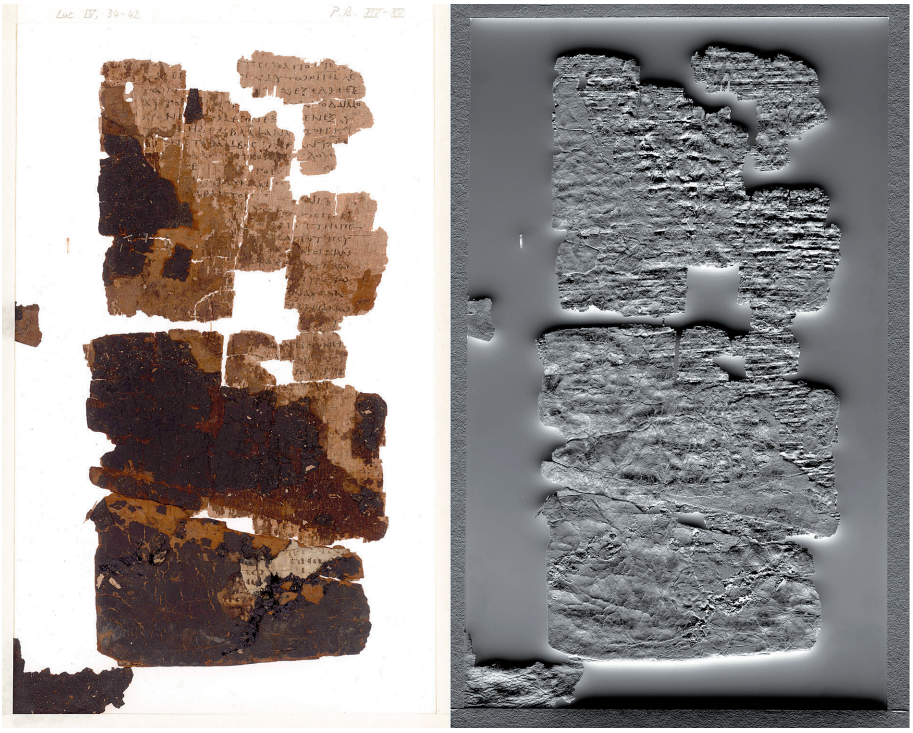

Fig. 2: Vatican Apostolic Library, Pap. Hanna 1 (*Mater Verbi*), f. 1A3r photographed in visible light and with three-dimensional imaging (© Vatican Apostolic Library)

After having captured all the pieces of the Hanna Papyrus in high quality conventional colour images, we realized that the text was faded or missing in some places. For this reason the whole manuscript was then photographed with ultraviolet fluorescence and at two different wavelengths in the infrared spectrum.[14] The results were surprising: UV fluorescence images made it possible to recover text as well as to discover specific conservation states of some fragments (a number of them, under fluorescence, show yellow reflectance in some places, which suggests that a substance was apparently applied to the papyrus sheet in these sections; furthermore, many small strips that fix the papyrus fragments to each other, which had been applied during former consolidation interventions, became visible). Infrared reflectography, on the other hand, allowed excellent recovery of the writing in those places where it is covered by residues of the leather of the ancient binding that adhered to the papyrus fragments.

Unfortunately, there were two fragments, numbered 1A2 and 1A3, whose texts could not be detected completely by imaging: fragment 1A2 consists of two papyrus pieces that are glued together and whose texts hidden on the inner parts remain inaccessible; fragment 1A3 was partially covered by a particularly large, dense portion of the leather binding. So in 2016 it was decided, in collaboration with the Diagnostic Laboratory for Conservation and Restoration of the Vatican Museums, to undertake a further investigation of the materials, with a double purpose: first, to try to read the part of text not yet accessible; and second, to contextualize the materials of which the fragments are made, performing a non-invasive survey without taking micro samples. It was decided to undertake two chemical spectroscopic analyses only on these two fragments: XRF (X-ray fluorescence elemental analysis) on thirty points, and molecular analysis in Raman microscopy (μ-Raman). These materials analyses were then followed up with an investigation using X-radiography.

Data mining of elementary analysis in X-ray fluorescence (XRF spectroscopy) suggested the vegetal nature of the ink, and consequently, an excellent preservation state of the ink.[15]

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[14] The Nikon D800 full-frame camera and two Kodak Wratten filters (85b for colour conversion and 2b to block reflectance of ultraviolet) were used for imaging in UV fluorescence. NIR shots were performed with a modified Nikon D800 camera whose IR Cut filter had been removed and which was equipped with optical filters suitable to block radiation of the visible and NIR spectrum at specific wavelengths in the infrared.

[15] Cf. Santamaria *et al.*, *Studi diagnostici del Papiro Hanna*, [4]: 'Le analisi in XRF non mostrano nessuna variazione significativa

X-radiography, by contrast, did not supply new information because of the vegetable nature of the ink, as carbon black ink is not detectable by X-rays.[16]

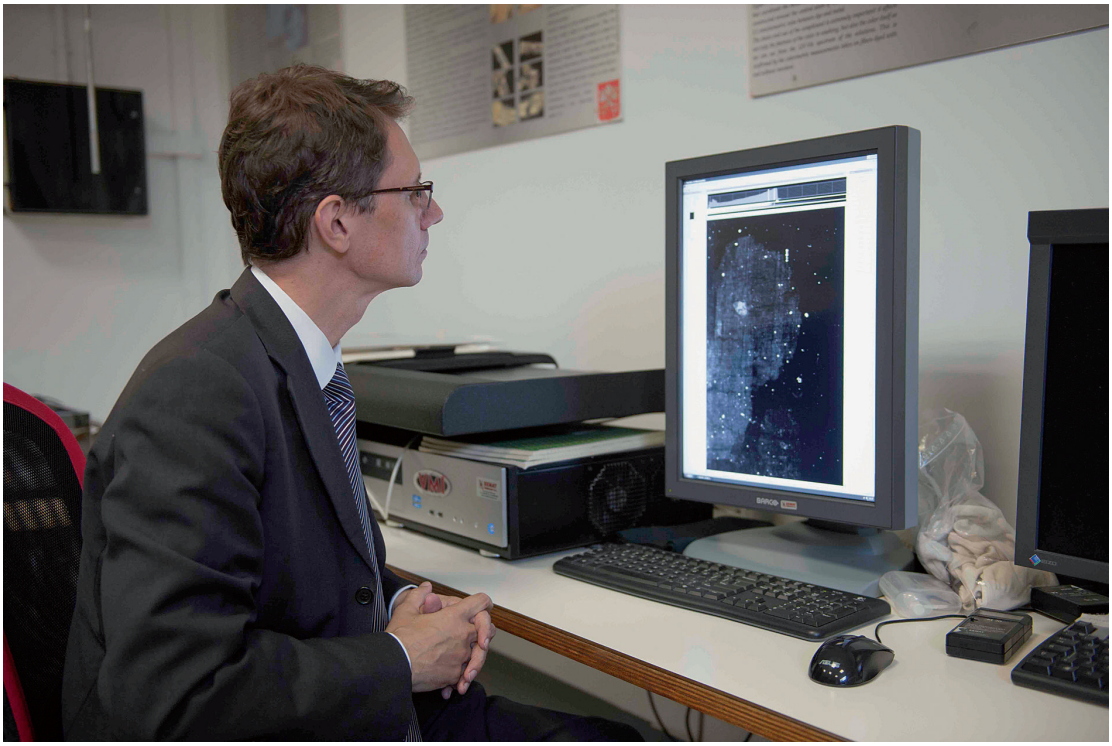

Fig. 3: Examining the radiography of Pap. Hanna 1 (*Mater Verbi*)
(© Vatican Apostolic Library)

Unfortunately we did not manage to read the writing on the back of the sheets of fragment 1A2 where these overlap. The graphic elaborations of overlapping of the radiographic images made in the Diagnostic Laboratory with the RGB images done by our Photographic Laboratory make it possible, however, to locate where multiple papyrus sheets are superimposed.

Regarding the conservation status of the papyrus, the μ-Raman analysis was not supportive, since the fluorescence produced by the material itself has affected the possible information concerning the conservation state of the cellulose; however, Raman microscopy also corroborated the hypothesis of the vegetal nature of the ink.[17]

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tra i valori (in conteggi per secondo) di ferro riscontrati sul supporto in papiro e in corrispondenza del testo. Si riscontra tuttavia la presenza di elementi metallici quali zinco, piombo e manganese che possono essere associati ad impurezze minerali. Anche la presenza in tracce di questi elementi è indicativa, poiché solo negli inchiostri a base di residui dalla combustione di ossa, avorio, carboni naturali, resine, gas naturale o olio (*carbon black*), possono contenere questi elementi come impurezze, in aggiunta a idrocarburi incombusti che impartiscono la colorazione scura (non sempre solo nera), e che rendono queste polveri in soluzione, molto stabili alla luce, agli acidi e alle basi e ne conferiscono un ottimo potere coprente. Se si trattasse, invece di inchiostri metallici, la concentrazione di metalli associata ai sali metallici della mescita sarebbe molto più significativa.'

[16] *Ibid.*, 'L'ipotesi che si tratti di inchiostro a base carboniosa è sostenuta anche dalle analisi effettuate. La radiografia non mostra nessuna variazione di radiopacità in corrispondenza del testo, ad indicare la mancanza di elementi a più alto peso atomico rispetto agli elementi che compongono la carta. Il metallo (Fe) presente negli inchiostri ferro-gallici dovrebbe mostrare una differente radiopacità, situazione che non si presenta per gli inchiostri a base carboniosa, la cui composizione è compatibile con gli elementi costituenti il supporto.'

[17] *Ibid.*, [4, 5]: '[…] considerando comunque la condizione inficiante del supporto, l'analisi μ-Raman non ha riscontrato la presenza né di ferro gallico (1474 cm^{-1} *sharp*), né di sali metallici (580 cm^{-1} *broad*), né di complessi organici di sottoprodotto del ferro. Tuttavia, non è stata riscontrata neanche la presenza di carbonio associabile a inchiostri carboniosi (1334, 1588 cm^{-1}). La differenza preponderante, però, sta nell'intensità degli *stokes* dell'effetto Raman; nel caso del carbonio la loro intensità è tale da poter subire facilmente l'effetto fluorescenza e quindi perdere il segnale. Nel caso del ferro gallico, l'intensità del picco a 1474 cm^{-1}, difficilmente subisce l'effetto fluorescenza del supporto. Questo spiega facilmente che se l'inchiostro fosse stato a base di sali metallici, o

When we opened the glass plate of fragment 1A3 for the XRF-measuring, we discovered that a large segment of the leather binding was actually only laid on the papyrus; by moving it, the script underneath became visible. Fragment 1A3 was then photographed again using the same techniques as had previously been used on the rest of the manuscript at our Laboratory (high resolution scanning, 3D-scanning, UV fluorescence photography, and IR reflectography), using, in addition, a new filter that cuts at 950 nm in the infrared spectrum. A new glass plate containing the piece of leather, now designated fragment 3A7, was created.

As the goal of reading the letters hidden between the two superimposed papyrus sheets of 1A2 has not been achieved, the optimal diagnostic method to reach this objective is yet to be identified. Currently we are trying to evaluate the non-invasive analytical technique of terahertz spectroscopy (THz).[18] This method is based on terahertz radiation that lies between the infrared and microwave regions (the frequency range is about 0.1–10 THz).[19] As it is low energy radiation weakly absorbed in most materials, it has the property of being able to penetrate into them, allowing measurements in transmission or in reflection to be carried out. It transmits especially well through dry and thin materials, making it particularly suitable for papyri. When using reflection mode, this method seems to be able to reveal features that are present at deeper layers of the sample; it has been thus tested on numerous artefacts, from manuscripts to mummies and antique lacquered furniture.[20] It is harmless: 'Unlike x-rays or ultraviolet radiation, terahertz waves don't "energize" the electrons of the molecules that absorb them. That means that those electrons don't change their state, altering the underlying atomic structure in the way that living tissue can be affected by x-ray radiation, or a work of art that will change color if left exposed to the sun.'[21]

At present, a modern double papyrus sample with carbon ink writing on both inner sides is being tested in T-ray imaging, in order to understand whether or not the equipment could be able to reveal the hidden text on fragment 1A2 of the Hanna Papyrus. Obviously, these tests are only suggestive, as a profound difference exists between ancient and present-day materials.

The second case study to be presented here regards a palimpsest whose origins go back to the Abbey of St. Columbanus in Bobbio, with the present call number Vaticanus latinus 5766. The upper script contains works of John Cassian copied in the 8th century, while the three different under scripts are parts of *Ius Ciuile Anteiustinianum* (5th century), the *Codex Theodosianus* (7th century), and the *Lex Romana Burgundiorum* (7th–8th century).[22] All four texts are written in uncial script. The undertexts run perpendicular to the direction of the overlying writing, as well as, in several cases, in the same direction (sometimes regularly, other times upside down).[23]

To the naked eye, the timeworn palimpsest sheets of the unbound manuscript show an intense browning due to a treatment with iron gall solution, whose irreversible oxidation process has seriously degraded the parchment structure, compromising its mechanical resistance and significantly altering the readability of the upper and under scripts. In the Vatican Library, even at the beginning of the 20th century, the awareness of the need of consolidation of the text and writing support of endangered palimpsests determined an intervention protocol established by the new Restoration Laboratory. The sheets were flattened by humidification and under pressure, then consolidated by applying one or more coating layers of gelatin, and afterwards desiccated under pressure between absorbent paper.[24]

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più specificamente metallo-gallato, il riconoscimento dello stesso mediante microscopia Raman sarebbe stato facilitato, viceversa il carbonio, non solo subisce con maggiore facilità l'effetto della fluorescenza, ma le bande di fingerprint del carbonio, coincidono con la zona in cui si concentrano le vibrazioni degli anelli aromatici delle resine e delle deformazioni dei CH_2 e CH_3 (per cui anche quelli della cellulosa del papiro).'

18 The validity of Terahertz technology as an investigation approach in the case of the Hanna Papyrus is yet to be determined. As an alternative to this technology, undertaking a survey by submitting the manuscript to a phase contrast tomography has been considered, but not yet undertaken.

19 Cf. Doria *et al.*, Tecnologie THz per i beni culturali presso l'Enea.

20 See the detailed introduction by Cosentino, Terahertz and Cultural Heritage Science, as well as the interesting investigation approaches in the report of Toth *et al.*, Integrating Optical Imaging of Mummy Mask Cartonnage.

21 See the interesting analysis collected by Hauser, What Lies Beneath?

22 Cf. Lowe, *Codices Latini antiquiores* I, 14–15; 40–41; Beeson, The Palimpsests of Bobbio, 176.

23 The VIS, UVF and NIR reproduction is disseminated at https://digi.vatlib.it/view/MSS_Vat.lat.5766 (accessed 01.07.2023).

24 Regarding the history of palimpsest conservation and reproduction in the Vatican Library, especially under the prefecture of Father Franz Ehrle SJ, who introduced these processes, see Németh, Recovery of conflicting textual identities, 412–418. Father Ehrle him-

The effects of these interventions applied to Vat. lat. 5766, together with the consequences of humidity and temperature changes over time to which the manuscript was certainly exposed,[25] damaged it even more, adding to the well-known problem of poor readability in areas with higher concentration of gallic acid further issues, such as the undulation and stiffening of the support treated with gelatin, and the widespread presence of cellulose microfibres transferred from the absorbent papers used during the drying treatments.[26]

The first approach to the imaging of the palimpsest was carried out using the technology reserved in the Vatican Library's internal Cicero Project for the imaging of palimpsests. Automatic high-resolution scanners, produced by the Japanese printing company Toppan, scan natural light and UV fluorescence images of each rewritten folio. It is then possible to superimpose these images using special software, in order to uncover the erased texts on the recycled parchment. However, the undeniable advantages of obtaining two images that can be used also separately for different purposes (natural light images for normal research, online dissemination, and printing; UV images for the study of the erased contents), together with the extremely high resolution (up to native 2.400 ppi on A3 format) of this technology, are unfortunately frustrated when we are dealing with material that has undergone an extensive application of tannic gall solution: both scanned images are dark, impenetrable, and difficult to process, also because of the static TIF format of the output file of the scanners.

We tried to overcome these limitations through a new experimental photo shoot using other equipment supplied to the Photographic Laboratory, for new imaging using both the ultraviolet and infrared spectrum.[27]

With regard to the shots using ultraviolet fluorescence, the approach was to try to cause less reaction, to counteract the excessive fluorescence due to the presence of different substances on the parchment, primarily gelatin. This objective was partially achieved, mainly due to the use of proper filters[28] and the experimental post-processing in Camera Raw. However, it must be said that this technique, although very effective on many sheets, did not achieve the hoped-for effect on all the folios. In some cases the almost total abrasion of the lower writing, in others the presence of paper fibers and/or gelatin, and especially the preponderant fluorescence of gelatin compared to the ink's fluorescence, have thwarted the intervention of the imaging scientist.

While using ultraviolet as excitation radiation, we had to take into account the fact that any substance present on the object exposed to UV radiation would have its own reaction. In our case it became clear, especially because of the brushed gelatin on the parchment sheets, that it was impossible to obtain an ink fluorescence excluding the strong fluorescence of the consolidating layer.

The new ultraviolet shots, however, compared to those produced with the Toppan scanner, improved the visibility of the text; moreover, they can be useful from a conservation point of view, since they show the different levels of concentration of gelatin on the different parts of the sheet, its distribution on the parchment, and other details evident to the expert eye of a conservator.

The extensive collaboration with the Library's Conservation Workshop permitted, at a certain point, the mechanical removal of parts with the greatest concentration of gelatin.[29] This operation recovers readability in

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self, in Über die Erhaltung und Ausbesserung alter Handschriften, suggests repeating the application of formaldehyde-containing gelatin several times, where necessary, being aware that this probably will not stop the deterioration caused by the gallic acid, but hopefully slow it down. See also Ehrle, Protokoll der internationalen Konferenz zur Erhaltung und Ausbesserung alter Handschriften. Furthermore, in BAV, *Arch. Bibl*. 218. pt. A., and especially in ff. 208–216, we find many handwritten notes, also written by Father Ehrle, reporting on these restoration procedures and the different techniques which were evaluated or applied during these years in the Vatican Library.

[25] The palimpsest arrived in the Pope's Library around 1618 (Sever J. Voicu, *pers. comm*., 12 February 2018). I am grateful to my colleagues Sever J. Voicu and András Németh for the bibliographical indications regarding the palimpsest.

[26] In 2008, the Diagnostic Laboratory of the Vatican Museums carried out a materials analysis by optical microscopy, Fourier-transform infrared spectroscopy FT-IR, and SEM/EDS, on the folios 43r and 45r of Vat. lat. 5766 in order to determine the nature and composition of the fibres and the coating layer present on the surface of these folios. Regarding this survey of the Diagnostic Laboratory of the Vatican Museums, see also Grimaccia, Conservation and preservation, [3].

[27] UV-induced detection in the visible range (fluorescence) with ultraviolet irradiation (UVF imaging) was performed with a Nikon D800 camera and illumination by short-wave ultraviolet radiation. For infrared reflectography, a modified Nikon D800 camera without low-pass filter, and natural warm-coloured light sources that already emit significant infrared radiation, were used.

[28] The same filters that have been used for the Hanna Papyrus: W2b, a long-pass UV Cut filter that absorbs ultraviolet radiation, blocking wavelengths below 395 nm, together with the amber filter W85b.

[29] The intervention carried out by the restorers focused on thinning, where possible, the excessive gelatin layer on single and rather limited spots.

single points and details, but cannot be considered decisive for the sheets where the concentration is such that the coating layer sometimes covers the entire folio, producing a strong white fluorescence under UV radiation.

The intervention of the colleagues of the Preservation and Conservation Department was also advantageous in the case of the folios of the Bobbio palimpsest whose legibility was compromised by the presence of paper fibres: they removed the fibres in the sections where there was major concentration, using the ultraviolet photos for better orientation. This preparatory operation made it possible to gain direct access to the writings on the parchment sheets and to fix them in clear images without disturbing interference.

Once these results had been obtained, the palimpsest was photographed in the infrared spectrum, a technique usually used in the photographic laboratory for the study of other types of documents. It was interesting to experiment with the infrared radiation's property of being able to infiltrate through the substance, both inorganic and organic, thus making it possible to reveal the lower layers invisible to the naked eye, aiming to overcome the layer made up of the gelatin-formaldehyde mixture, trying to reach the ink below.[30]

In some cases this kind of approach did not produce the expected results, since, despite the fact that infrared radiation almost always passes through the gelatin and the stains of gallic acid, at times the infrared also passes through the ink below, both in the upper writing and in the lower script, with consequent reduction of readability. Therefore, this technique can be considered helpful, but not conclusive, for a number of the sheets.

Infrared photography, however, has proved to be decisive for those sheets containing a lower writing which is different from the upper one. In these cases the chemical component of the ink reacted decisively to this technique. Imaging made it possible to almost completely isolate the erased text from the more recent one, as well as from the extraneous materials present on the parchment, enabling almost total legibility of the inferior text.[31] It is particularly encouraging that it was possible to obtain surprisingly good imaging of the *scriptio inferior*, especially in the case of those originals in poor condition whose corresponding images in visible light and in ultraviolet fluorescence were of very poor quality.

Fig. 4: Vatican Apostolic Library, Vat. lat. 5766, f. 21r photographed in RGB, in UV fluorescence, and with infrared reflectography (© Vatican Apostolic Library)

[30] Materials react differently to infrared radiation, reflecting, absorbing, or transmitting it. The visible result in photography of this illumination on materials depends on the chemical interactions of the material's compounds and on the frequency of the light with which these materials are illuminated. The results in photography, therefore, are often unpredictable, and an experimental attitude has to be held, sometimes allowing interesting discoveries even because of 'errors' committed by the imaging technicians.

[31] The two filters W89b (that cuts at 690 nm) and W87c (at 790 nm) were suitable; in almost every case, the second has been found to be the more appropriate.

The photographic recovery of Vat. lat. 5766 cannot be considered complete, as there are challenges that have not yet been overcome: the reduction of fluorescence of the gelatin coating layer in ultraviolet photography, and the overlapping of upper and under script that cannot be tackled with conventional photography. To finds solutions to these problems and make advances in our research on the whole manuscript, we will have to persevere and eventually have recourse to different and more powerful technologies.[32]

It is worth mentioning that the Laboratory's historic archive preserves b/w negative transparencies and glass plates of a number of folios of Vat. lat. 5766 produced during previous decades. These analogue reproductions allow a similarly good readability of both writings, as do the new digital IR-shots. The images of Vat. lat. 5766 published in Lowe's guide,[33] edited in 1934, are also of the same good quality. This confirms the importance of a historical photographic archive alongside new cutting-edge photographic technologies applied to manuscripts. The reason for this is that old reproductions often document a better preservation state of the codex, and that analogue photography often provided good—sometimes unexpectedly good—quality.

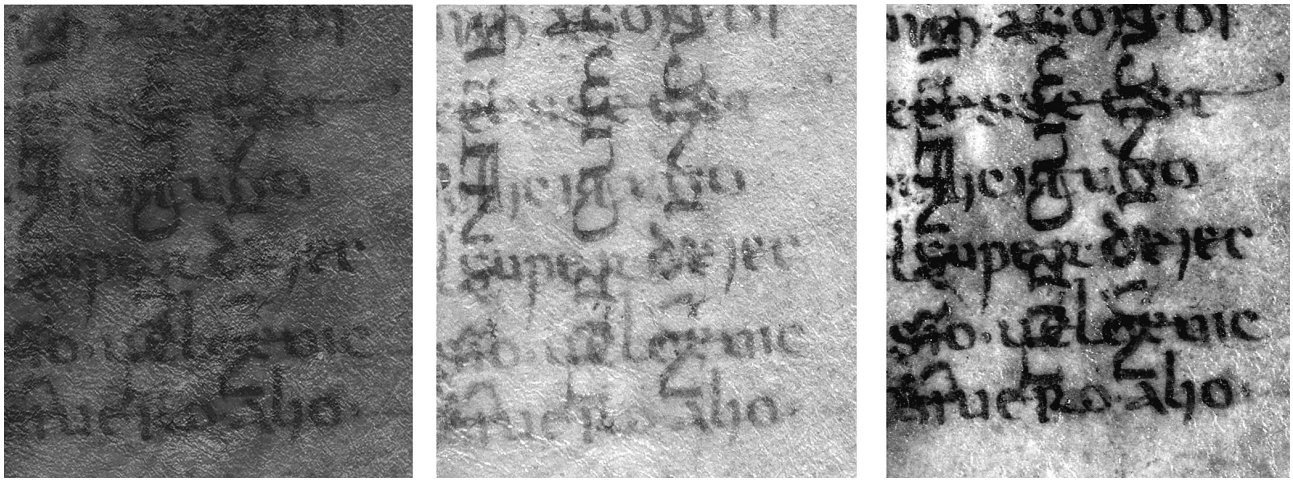

Fig. 5: Vatican Apostolic Library, Vat. lat. 5766, f. 46r (detail) captured in visible light with a palimpsest scanner, photographed digitally in NIR, and reproduced on a b/w negative transparency of the 1960s
(© Vatican Apostolic Library)

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[32] A multidisciplinary approach, combining materials investigation and image analysis, could be beneficial. Given that different inks, because of their different chemical composition, should respond in distinct way to X-rays, X-ray fluorescence scanning performed in a synchrotron radiation-based source could help make it possible to separate the different text layers.

[33] Cf. Lowe, *Codices latini antiquiores* I, 14–15.

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GalenQt: A New Multispectral Imaging Tool for Recovering Lost Text and Its Use for the Reconstruction of the Lacuna in Galen's *Simple Drugs*, Book 8

The Syriac Galen Palimpsest (henceforth SGP) is, as its name suggests, a palimpsest that contains a Syriac version of one of Galen's writings—namely, books 2–9 out of the eleven books of *On Simple Drugs*.[1] The challenge is to read the erased text, which in the case of the SGP is a very variable task. On some pages, the undertext is visible to the naked eye, and indeed this is how the palimpsest was initially identified.[2] In other parts, however, there is no visible undertext whatsoever. Multi-spectral imaging and image analysis have traditionally been powerful tools used to read erased texts in palimpsests, as the example of the Archimedes palimpsest amply illustrates.[3] Yet until today, scholars have generally had to rely on looking at sets of raw images and images processed by imaging experts when studying the SGP and other palimpsests, because a dynamic and user-friendly multi-spectral image analysis tool has been lacking. We had set ourselves the task of developing such a tool during a project funded by the Arts and Humanities Research Council which aims at deciphering the SGP.[4]

Over the course of the last three years, we have developed such a new tool, GalenQt, which enables humanities researchers with no technical computing expertise to manipulate sets of multi-spectral images in novel ways. We launched the new tool during the Vienna conference on 27 April 2018, and have subsequently made numerous improvements.[5] The present paper describes this new tool and offers a concrete example of how it helps to read the erased undertext. We shall first briefly give some background information on how SGP was imaged and analysed, then explain our own design goals for GalenQT and how we endeavoured to meet them. In particular, we explain how to use the new software tool by looking at a concrete example.

This example is taken from book 8 of Galen's *On Simple Drugs*, and notably the section dealing with drugs beginning with the letters *phi* and *chi*.[6] We chose this particular passage of the manuscript because the parallel witness for the Syriac translation by Sergius of Rēš ʿAynā of books 6–8—namely London, British Library, MS Add. 14,661 (henceforth BL)—contains a lacuna here. This lacuna corresponds to three folios in SGP,

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1 On Galen's *Simple Drugs* in Greek, see Petit, La tradition manuscrite; Petit, Théorie et pratique.

2 Hiersemann, *Katalog 500*, no. 20. Since 2010, there has been considerable scholarly activity in working on this palimpsest; see Bhayro *et al*., Collaborative Research; Bhayro and Brock, The Syriac Galen Palimpsest; Bhayro *et al*., The Syriac Galen Palimpsest; Bhayro *et al*., Imaging the Syriac Galen Palimpsest; Bhayro and Hawley, La littérature botanique et pharmaceutique; Hawley, More Identifications; Kessel, Membra disjecta sinaitica I. In particular, see the special issue of *Manuscript Studies* 3.1 (2018), guest edited by William Noel and Ralph M. Rosen, which is devoted solely to this topic.

3 Netz *et al*., *The Archimedes Palimpsest*.

4 The Syriac Galen Palimpsest: Galen's *On Simple Drugs* and the Recovery of Lost Texts through Sophisticated Imaging Techniques (September 2015 to February 2020).

5 Both the original and the latest release can be found on https://github.com/wol101/GalenQt (accessed 01.07.2023).

6 12.150–154 Kühn (chapters 21.5–22.6).

the second of which is particularly hard to read and will be the focus of the present contribution.[7] The poor readability of the selected passage renders the reconstruction of the Syriac much more difficult and therefore presents a true challenge to demonstrate the capabilities of GalenQt. We also employed a new methodology of digital philology that relies on a bilingual digital corpus capable of being searched in innovative ways. We have previously described this methodology in an article reconstructing the beginning of the lacuna and will not dwell on this topic here.[8] Let us therefore return to imaging and image analysis, and begin by outlining what had been done prior to our project.

IMAGING BACKGROUND

In order better to read the undertext, the whole manuscript was photographed at a resolution of 7216 by 5412 pixels with a multi-spectral imaging camera using 13 different illumination wavelengths from 365 nm to 940 nm, thus covering the complete visible spectrum and extending into the infrared and ultraviolet ranges. Extra images were taken using a selection of filters and raking light options such that 23 separate images were taken for each page. The entire collection of images has been made available to the research community via the OPenn digital repository of the University of Pennsylvania Libraries as Free Cultural Works, and it is this image collection that is the starting point for this project. In their raw state, the images created using ultraviolet illumination generally show the undertext the most strongly. Unfortunately, this alone is rarely enough to make the text readable. The images on the web site[9] have been processed to some extent from the original images. They have been contrast-adjusted and down sampled from the original 16 bit images to 8 bits, and various image enhancements have been tried, including creating pseudo-coloured composites from multiple greyscale images. However, the approaches taken are largely automated and it is clear that further improvements in legibility could be made by using different multi-spectral algorithms.

The challenge of improving the legibility of the undertext is primarily one of maximising the contrast between the undertext and the other elements within the images: the parchment, the overtext, and other markings on the manuscript, such as rubrics. This problem has been addressed in many fields of science since multi-spectral imaging (and indeed its extension, hyper-spectral imaging) is commonly used in remote sensing applications and there is considerable interest in maximising the information content in the images obtained.[10] There are two main goals for multi-spectral image processing. The first is to allow a human to see as much as possible in the image, and the second is to automatically identify what is in the image. In our context this would be the difference between making the palimpsest legible to a scholar, and automatically reading the manuscript.

This paper will concentrate on the first of these options, since training a machine to read even perfectly legible Syriac would be a very challenging prospect. In terms of making images more legible, what we are looking for are ways of combining the multiple images recorded and presenting them to the user such that the details of interest are enhanced. This is essentially a problem of dimensional reduction. In the SGP, each folio has been photographed 23 times, and so for each pixel we have 23 different grey levels of information; the dimensionality of the source data is therefore 23. A grey scale image has a single dimension of information, and a colour image has three dimensions of information: its red, green, and blue intensities equating to the colour sensitivities of the three different cell types in the human eye. Therefore a dimension reduction algorithm should be a good way of presenting the information contained in the original 23 images in a smaller number of images and these should demonstrate better contrast between information containing aspects and background.

Dimension reduction techniques, although originally developed as statistical tools, are now often considered part of machine learning.[11] There are many different approaches, but in the context of machine learning we can usefully divide them into supervised and unsupervised approaches. Unsupervised approaches are fully

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[7] SGP, f. 166r+171v (chapter 21.5 and the beginning of chapter 21.6), f. 214r+221v (chapters 21.6–22.6) and f. 214v+221r (the end of chapter 22.6).

[8] 'On *phlómos*' (chapter 21.5, 12.150 Kühn); Afif *et al*., Analyzing Images, Editing Texts.

[9] http://www.digitalgalen.net (accessed 01.07.2023).

[10] For a review see Ose *et al*., Multispectral Satellite Image Processing.

[11] See for example, Marsland, *Machine Learning*.

automated and do not require any training data and are thus very easy to use. However, whether an unsupervised technique is able to enhance a specific aspect of a multi-spectral image is not guaranteed, since it is up to the algorithm to identify what might be considered interesting aspects of the image, and not the user. Supervised approaches require some training by the user. This, of course, takes longer, since for some approaches the training data set needs to be extensive, and it requires that the user can identify some areas of interest in the original images to create the training data set. On the plus side, though, because the user has explicitly identified *a priori* those parts of the image that are interesting, the success rate of supervised dimensional reduction techniques is likely to be higher. A combination that can work well is the use of an unsupervised technique initially to help locate areas of the image that contain undertext. Once identified, these areas can be used for training a supervised algorithm which will then lead to an optimal image separation.

Probably the most common unsupervised dimensional reduction technique used for multi-spectral imaging is principle component analysis (PCA). This technique is available as a plug-in for the popular free image manipulation software ImageJ and is often used as a first step in processing multi-spectral images.[12] The idea behind PCA is that the algorithm finds the direction within the high dimensional data that shows the most variation. This is the first principle component axis. It then finds the direction orthogonal to this axis that encompasses the largest proportion of the remaining variation. This process is repeated until all dimensions have been used up. We can then generate a rotation matrix that converts the original data (i.e. the pixel grey values) into this new principle component space. We still have (in the case of SGP) 23 images, but the first image is guaranteed to contain most of the variation of pixel intensities, and each subsequent image will contain progressively less variation. If we are lucky, one of these new images (or perhaps a combination of several of them) will show good separation between the features we are interested in and the background. There are, however, a very large number of other techniques. Some of these are variations on principle components, such as kernel principle components, and others are completely different approaches, such as locally linear embedding and isomaps.[13]

Similarly there are a very large number of supervised techniques. Almost all the classic machine learning algorithms can act in a dimension reduction capacity such as artificial neural networks and support vector machines. We have had very good success using linear discriminant analysis (LDA), which is very easy to train and works very rapidly on large images that can otherwise be slow to process.[14] LDA is a process of finding the linear combination of the input dimensions that maximises the separation between the training classes whilst at the same time minimising the spread of the data within the classes. It also reduces the dimensionality of the input data to the number of individual categories minus 1. LDA in this context is identical to canonical variates analysis (CVA) and is a more commonly encountered name in the imaging field. Our previous implementation used the commercial package Matlab (https://www.mathworks.com/) and the training data was generated by selecting points within ImageJ and exporting them as comma separated text values containing the coordinates of pixels that had been classified into the various text and background categories for the SGP. This approach is both complex and unnecessarily time consuming. As far as we are aware, there are no freely-available integrated tools for both training and applying supervised dimension reduction techniques to multi-spectral images.

DESIGN GOALS

We therefore set ourselves the task of producing such an integrated tool to allow the easy application of supervised and unsupervised techniques to multi-spectral images. Ease of use is key because we strongly believe that the most important requirement is to put the image-processing power into the hands of the scholars who will actually be interpreting the documents. These experts will have their own working preferences, will spend many hours looking at the images in great detail, and will therefore want to customise their working environments, and be able to make flexible choices about how multi-spectral images are combined and displayed. We also wanted our tool to run on a range of different platforms. Most multi-spectral image acquisition systems are tied to particular hardware (commonly Microsoft Windows), and there are specific philological software

[12] https://imagej.nih.gov/ij/ (accessed 01.07.2023).
[13] For a detailed review see Van der Maaten *et al*., *Dimensionality Reduction*.
[14] Afif *et al*., Analyzing Images, Editing Texts.

packages that again are limited to specific operating systems (commonly Apple Macs), and so we predicted that users would want to run our software on at least these two platforms. We initially considered producing a plug-in for ImageJ, because this software already exists for a range of hardware and provides a great deal of useful functionality. ImageJ, however, is a general purpose imaging tool with a very large number of functions that are not useful for enhancing the readability of manuscripts. This generality means that the interface is unnecessarily complicated and finding the useful functions is much harder and more confusing than it would be in a dedicated tool. Instead we decided to create a tool from scratch that concentrated on performing a limited range of functions well. We then had to decide on a minimum specification for what we wanted the tool to do. The functions that we envisaged the tool would provide are the following:

1. Organising multiple images associated with a folio, allowing rapid selection and display so that the user can find interesting features quickly.
2. Real time update for essential viewing controls such as brightness, contrast, and gamma so that the user can customise the appearance of the image.
3. Straightforward interface to allow the user to create pseudo-colour images by applying individual grey scale images to the red, green, and blue colour channels.
4. Interactive method for generating training sets for supervised dimensional reduction algorithms.
5. Interface for choosing images, training sets, and applying a range of multi-spectral supervised and unsupervised learning techniques.

The requirement for real time update meant that we needed to take advantage of the processing power of the graphics card directly, and we made the design decision that the program should be primarily aimed at high-end computers with larger amounts of memory, and that speed was the primary goal. This being the case, we decided against using either a scripting language such as Python or a language that runs on a virtual machine such as Java. The requirement for cross-platform compatibility, however, meant that we could not simply use the native interface for a particular computing system and therefore had to choose one of the available free-to-use cross platform widget sets. The main choices are wxWidgets (https://www.wxwidgets.org/) and Qt (https://www.qt.io/), and we chose the latter because it has better support for GPU programming. Qt requires the underlying code to be written in C++, which in general works well for imaging applications, because it provides high speed, low level access to the underlying data, and also because there are a large number of support libraries for image and numerical processing that can be easily incorporated.

There are some particular challenges when working with images in a multi-spectral context. First, pixel intensities are generally handled computationally as unsigned integer values, commonly with 8, 16, or 32 binary bits depending on the source. However, dimension reduction techniques are almost always floating point processes. The most time-efficient way of handling this is to treat the image as a floating point entity throughout. Unfortunately the Qt image compositing system cannot handle floating point images and converting the image back to an 8 bit value before display is relatively time consuming. Fortunately, recent OpenGL implementations can cope easily with floating point textures, and by using custom shaders we can leave the resultant images in floating point format and at the same time allow the contrast, brightness, and gamma calculations to be performed directly on the graphics card, which allows for very rapid update and also means that we can use the graphics hardware directly for scrolling and rotation.

The second issue is that by their very nature multi-spectral imaging techniques tend to produce large numbers of images. The raw SGP data consists of 23 TIFF images per folio. When performing processes such as PCA or LDA we tend to generate further images and we might want to save particular composite images for publication or for use with other software. At the same time each of these images has associated metadata. For SGP this is contained in separate text files with some additional information encapsulated within the TIFF files. Our solution to handling this is to create a single XML project file that keeps track of all the images associated with a particular folio. This file contains the locations of the images and also the training data categories and point locations. The file does not duplicate the image data and so this approach, whilst space efficient and easily extensible, is somewhat fragile since it relies on the relative locations of the image files to remain constant. Currently we do not have a good solution to this issue but in future versions of the software we hope to incorporate repair functions so that missing or orphaned images can be tracked down.

THE NEW SOFTWARE

Our current software, GalenQt, is available to download from GitHub (https://github.com/wol101/GalenQt). There are compiled releases for MacOS and Windows, with full source code for compilation on Linux. This release covers the basic functional requirements, but we are planning to extend a number of areas in the near future. The process of enhancing an SGP folio can be broken down into the following steps.

1. The first step is to decide on the layout of the local copy of the images. In general, we recommend that each folio has its own folder that contains the project XML file that specifies the locations of the images and the training data. Within that folder we create a subfolder that contains the 23 raw, 16 bit images for that folio. Any images generated by the dimension reduction algorithms can be stored in other subfolders. In this way, as long as the whole folder and subfolders are always copied as a single unit, the image links saved in the project XML file will remain intact.
2. Once the folder structure has been decided we are ready to create a new project file using the File/New menu item.
3. Once the project file has been created we can add images to it using the File/Import Images… menu item. The project file can be saved and opened as normal and, as long as the images have not been moved relative to the project file, they will all be found again.
4. Imported images will be loaded into memory and the Image List on the right hand side will be populated with their names. With SGP each 16 bit grey scale image is 76 MB and these will double in size when converted to 32 bit floating point format internally, so just displaying these images will take up 4 GB of RAM. Processing these images is likely to double or triple the space requirement so it is not recommended to use a computer with less than 16 GB of RAM; 32 GB is likely to perform better. It is also recommended that the graphics card has as much memory as possible since then the images can be cached on the card and performance will be much faster.
5. The raw images are automatically mapped so that their lowest value is displayed as zero brightness and their highest value is displayed as maximum brightness. Each image can be assigned to the red, green, or blue channels and an image can be mapped to more than one channel. Double clicking on the image name in Image List will automatically assign the image to all three channels and it will appear in grey scale.
6. The currently selected image will show its brightness distribution in the Histogram panel. This panel shows the original brightness distribution and the brightness distribution after the minimum, maximum, gamma, and zebra values are set. These values can be set numerically using the spin boxes or using the sliders on the left hand side. The brightness displayed is governed by equation 1.

$$y = mod(clamp\left(\frac{x - x_{min}}{x_{max} - x_{min}}, 0{,}0.99999\right) \times zebra, 1)^{\gamma}$$

   Where y is the output intensity scaled between 0 and 1, x is the input intensity, x_{min} and x_{max} are the range settings, *zebra* is the zebra setting, and γ is the display gamma.
7. The image view can be changed using fairly standard mouse interactions. Clicking on the image enables drag based panning, the central scroll wheel of a mouse zooms, and there are scroll bars, zoom buttons and 90° rotation buttons.
8. Unsupervised routines (currently only PCA is implemented) require that the source images are selected. Once more than one image is selected the Process/PCA can be chosen and this will pop up the PCA dialogue. Here the output folder needs to be selected because this is where the newly generated PCA images will be saved. There are then a number of options which affect the way the PCA is calculated. During this process memory usage will increase since both the source and destination images are held in memory. Once the PCA images are generated they are automatically loaded and made available in the project file. Generated TIFF images are floating point format which may cause difficulties when reading them into some other software. Adobe Photoshop is perfectly happy but programs like Microsoft Word will not read them. If the image is in view and exported using the File/Export Image option then an 8 bit colour TIFF image using the currently selected scaling options will be created, and this image can be easily used elsewhere.

9. Supervised routines require a training set. This is generated by manually selecting points on the image and assigning the point to a particular category. This is handled by right clicking into the panel below the image list. There will then be the option to create a new points folder. This is not created on disk but within the project file itself since all the training data is held in the project file. Once a points folder is created, right clicking on the points folder will allow point lists to be created. For the SGP we typically train on parchment, overtext, and undertext, with perhaps rubrics or decorations as additional categories. On folios with water damage these might need to be further subdivided, since the intensities in the water-damaged areas are different from the intensities elsewhere. Once a point list has been created it can be made current and points can then be added by shift left clicking on the image. Right click also allows points to be deleted if they are erroneously placed. The number of points required for training depends on the supervised method and the amount of variation in the intensities. Typically 50 or more points for each category seems to work quite well.
10. Supervised routines (currently only LDA is available) become available once at least 2 point lists have been selected and at least two images. The source images can be the results of previous processing or they can be the raw images in any combination. Once the LDA dialog is displayed you have the option to select the output folder where the new images will be created, and you can specify the maximum number of images. In general, it is useful to have all the images (which is the number of classes minus one). After the LDA has completed, the program displays a clustergram illustrating how well the different classes have been separated. Once the initial LDA has been performed it is usually possible to see the undertext much more clearly than before and this new image can be used to improve the training set.

USING GALENQT WITH THE SYRIAC GALEN PALIMPSEST

Figure 1 illustrates how GalenQt has helped us read specific folios in the SGP. Panel A shows a portion of f. 214r+221v as illuminated under white light. The overtext is clearly visible but there is almost no indication of undertext in this area of the page. Panel B shows the page viewed under UV light (365 nm) and here we can start to see some of the undertext showing through, but the contrast is relatively poor and it is almost impossible to read the undertext in this image. Panel C shows the image that best reveals the undertext after the set of

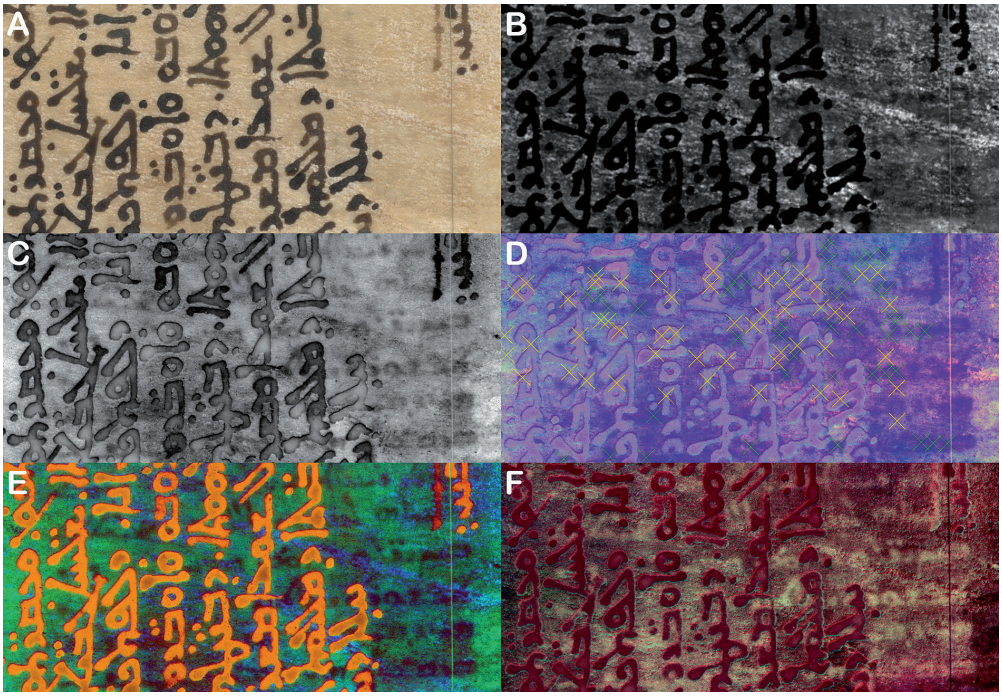

Fig. 1: portion of f. 214r+221v under white light (A); UV light (B); processed by PCA (C); marked up for LDA (D); and initial (E) and final (F) LDA result (© Owner of the Syriac Galen Palimpsest and the University of Manchester, Creative Commons Attribution 3.0 Unported Access Rights)

images have been processed by PCA. In this particular case, the 4th principle component demonstrates reasonable separation of the undertext, illustrating the value of this method as an initial screening tool. To improve the legibility of the image further we need to produce a training set where the scholar identifies the particular points on the image that correspond to different features. Panel D shows this process within GalenQt where areas containing undertext are marked on a pseudocoloured image created by applying individual greyscale images to each of the red, green, and blue channels, and adjusting the individual brightness and contrast values. Once this manual identification step has been completed, we can use LDA on the image. A single pass through is shown in Panel E, but we can then use this improved image to identify more undertext-bearing areas and that provides a better training set that more completely captures the variation within the undertext. We can also use different processing options. Panel F shows the final result of using three passes of LDA. The separation is about as good as can be achieved using this approach.

THE RECONSTRUCTION OF THE LACUNA IN BOOK 8

The transcription and reconstruction were performed using our established methodology, which consists mostly of a cross-search within the parallel Graeco-Syriac corpus of books 6–8 of Galen's *Simple Drugs* on the Sketch Engine platform. We used different query functions including search within a context and regular expressions search (CQL). The common vocabulary within books 6–8 allowed us to reconstruct substantial parts of all eleven entries with the exception of those lines (particularly, in chapters 21.6, 21.7, and 22.5) which belong to the gutter area of the secondary bifolio, where the parchment is damaged and the folio torn apart.

Our reconstruction of the following entries from the SGP is mainly based on the edition of the Greek text by Kühn and the Greek manuscript Vatican Urbinas gr. 67 (henceforth U).[15] In most cases, the *pínax* in BL enabled us to reconstruct the rubric titles that are invisible on the multi-spectral and processed images. To this end, we considered both the space in the *pínax* and in the rubrics of SGP. In addition, we used some parallel texts which enabled us to reconstruct the relevant portions of the text in book 8. Thus, we considered the concise Arabic version of Galen's *Simple Drugs* preserved in the manuscript Paris, Bibliothèque nationale de France, arabe 2857 (henceforth P) containing chapters 21.6 (ff. 114v–115r) and 22.4 (f. 115r–v).[16]

We also relied on three indirect Syriac sources. The first is the Syriac medical handbook (*kunnāšā*) compiled by Īšōʿ bar ʿAlī (9th century) preserved in Damascus, Syrian Orthodox Patriarcate, MS 238 (henceforth D). The first book (*mēmrā*) of this seven-part handbook deals with simple drugs and constitutes an abridgement of books 6–8 of Galen's *Simple Drugs*.[17] The second source is quotations from the Syriac version of Galen's *On Simple Drugs* contained in Ḥunayn ibn Isḥāq's own work *On the Properties of Foodstuffs*.[18] For this compilation, three manuscript witnesses are available, including the manuscript Mingana Syr. 661 (henceforth M), which was available for us to consult. Although both sources include a Syriac translation of the Galenic passages that differ from that by Sergius of Reš ʿAynā, they still employ a medical vocabulary that is very close or similar to the latter. MS D, f. 64r–v offers evidence for chapters 21.6, 21.8, 21.11, 22.1 and 22.2, whereas Ḥunayn's *Properties of Foodstuffs* includes two entries attributed to Galen related to the date-palm (cf. chapter 21.6). One deals with dates, palm spathes and palm pith, while the other treats palm spathes and palm pith only (MS M, ff. 118v–120r).

The third source is Bar Bahlūl's *Lexicon* (10th century). We were able to establish that in some cases it includes verbatim quotations from Sergius' translation of *Simple Drugs* (see for example chapter 22.1). Sergius' translation, at least of book 8, was therefore available to Bar Bahlūl and served as one of the sources for his *Lexicon*. The edition of the texts below illustrates the significance of this material for restoring the lacuna in book 8, which covers the missing folios in BL.

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[15] About this manuscript's relationship to the Syriac transmission of *Simple Drugs* see Martelli, Galeno grammatico; Afif *et al*., On Digamma and the Armenian Earth.

[16] About this manuscript, see Ullmann, *Wörterbuch*, 27.

[17] Kessel, A Syriac Medical *Kunnāšā*.

[18] Hawley, Preliminary Notes. See also Bhayro *et al*., The Syriac Galen Palimpsest, 139–143.

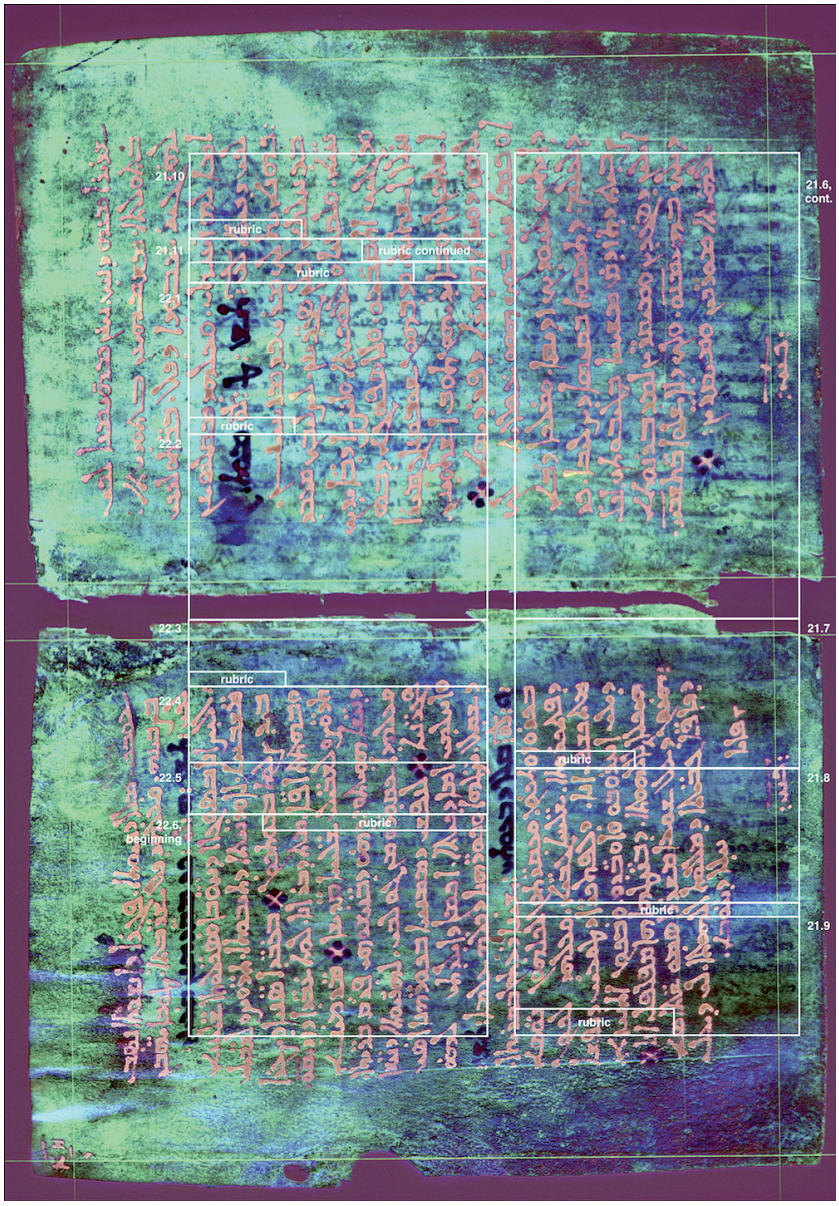

Fig. 2: a mark-up map of f. 214r+221v, LDA-processed (© Owner of the Syriac Galen Palimpsest and the University of Manchester, Creative Commons Attribution 3.0 Unported Access Rights)

[Chapter 21.6]

[12.151 Kühn] [ς΄. Περὶ φοίνικος.] Φοῖνιξ τὸ δένδρον στυπτικῆς μετέχει δυνάμεως ἐν ἅπασι τοῖς ἑαυτοῦ μέρεσιν. ὁ μὲν οὖν τῶν κλάδων χυλὸς αὐστηρός ἐστιν ἐξ ὑδατώδους οὐσίας χλιαρᾶς καὶ γεώδους ψυχρᾶς συγκείμενος. ὁμοίας δὲ τούτου· φύσεώς ἐστι καὶ ὁ καλούμενος ἐγκέφαλος ἐδώδιμος ὑπάρχων. ὁ δὲ καρπὸς αὐτοῦ καὶ μάλισθ' ὁ γλυκὺς οὐκ ὀλίγης μετείληφε θερμότητος. ἐδώδιμος δ' ὢν εἰς πολλὴν ἔρχεται χρῆσιν, οὐ μόνον ἔξωθεν ἐπιτιθέμενος, ἵνα τονῶσαί τι καὶ ξηρᾶναι καὶ συναγαγεῖν καὶ πιλῆσαι καὶ πυκνῶσαι χρῄζομεν, ἀλλὰ καὶ ὡς σιτίον λαμβανόμενος ἅμα τε τοῖς ἄλλοις καὶ αὐτὸς καθ' ἑαυτόν. ὃ δὲ καλοῦσιν ἐλάτην, τὸ ἁπαλὸν ἐκβλάστημα τοῦ φοίνικος, τὴν αὐτὴν τῷ κατ' αὐτὴν ἐγκεφάλῳ δύναμιν ἔχει. τὸ δ' οἷον ἀμφίεσμα αὐτοῦ στυπτικὴν μὲν καὶ αὐτὸ κέκτηται ποιότητα, ξηραίνει δ' ἐπὶ πλέον ἁπάντων τῶν εἰρημένων, ὡς ἂν καὶ τῇ τῆς οὐσίας συστάσει ξηρότερον αὐτῶν ὑπάρχον καὶ ἥκιστα μετέχον ὑγρότητος, ὥστε δεόντως ἐπὶ τῶν σηπεδονωδῶν ἑλκῶν αὐτῷ χρῶνται. καὶ τοῖς συνάγουσι τὰ κεχαλασμένα τῶν ἄρθρων φαρμάκοις μιγνύουσι καὶ ταῖς [12.152 Kühn] ἡπατικαῖς τε καὶ στομαχικαῖς δυνάμεσιν, ἔξωθέν τε καὶ ἔσωθεν. ἔστι δὲ καὶ ἡ ῥίζα τοῦ φυτοῦ ξηραντικῆς ἀδήκτως δυνάμεως, ἔχουσά τι καὶ αὐτὴ στύψεως.

On the date-palm.

The date-palm tree has astringent power in all its parts. The juice of its branches is bitter,[19] because it combines a warm watery substance with the cool earthly one. Of similar nature to it (the juice) is the so-called pith, which is edible. Its fruit, and especially the sweet one, has considerable warmth. Since it is edible, it has many uses.[20] It is not just applied externally, when we use it for tightening, drying, closing, compressing, and firming up. It is also taken as a food, either with other things or by itself. The tender sprout of the date palm, called 'spathe (*elátē*)'[21] has the same power as its pith. Its membrane-like thing[22] also has an astringent quality and dries more than all the other [parts] just mentioned. For it is both drier in the composition of its substance and has extremely little moisture[23], so one necessarily uses it[24] on septic wounds. One also mixes it with the medicines applied to limbs to fight paralysis and with drugs for liver and stomach disorders, the latter being used both externally and internally.[25] The root of the plant also has the drying power whilst not being pungent, and also some astringency.

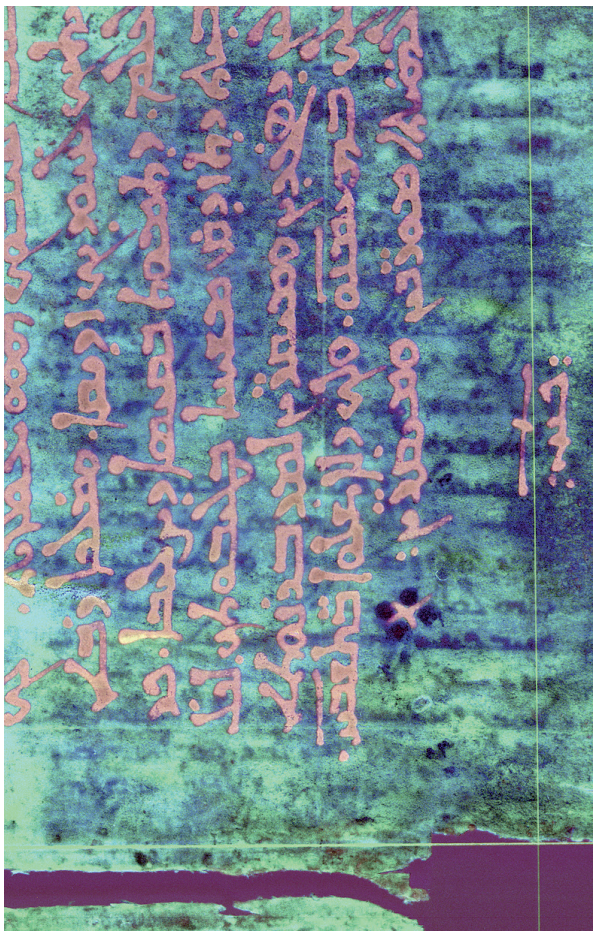

Fig. 3: portion of f. 214r+221vA, chapter 21.6 (continued). Undertext in black (© Owner of the Syriac Galen Palimpsest and the University of Manchester, Creative Commons Attribution 3.0 Unported Access Rights)

[19] SGP: 'very bitter'.
[20] ἐδώδιμος δ' ὢν εἰς πολλὴν ἔρχεται χρῆσιν: not in U; SGP: 'it is edible and fulfils the great need/use'.
[21] SGP: 'Their spathe that is called *elátē* [...] the tender sprout of the date-palms'.
[22] SGP: 'the membrane-like of this blossom'.
[23] SGP: 'it does not have very much moisture'.
[24] SGP: 'we use it'.
[25] SGP: 'and they are [applied] externally and taken [internally]'.

[SGP f. 166r+171vB] ܗܕܐ ,ܡܐܟܠܐ[26] ܡܢܝܐ ܠܗ
ܟ ܕܟ[ܪ] ܡܝܢ ܠܗ ,ܡܐܟܠܬܐ ܒܗ [ܪ]ܝ[27].ܫܗܘܬ ܡܫܠܚܬ ܗܕܝ ܟܐ ܗܦ ܗܠܐ
ܪܝܫܐ ܐܡ ܫܪܐ ؛ܡܫܟ ܗܟܝ ܗܠ ܒܝ ܠܐ .ܪܝܫܐ ܗܟܝܪ ܟܐ ܐ[28][ܪܝ]ܥܐ ܗܟܐ ܗܟ
ܪ[ܦ] ܪܫܟܟܐ ܗܠܐ [ܐ]ܡ ܒܪܝܫܐ [ܡܝܪ]ܐ .ܚܪܫܐ ܫܪܐ ؛ܗܠܐ[29][ܗܠ]ܟ
ܟ ܬܠܐ ܚܠ[..]ܟ ؛[..]ܡܠ[..] ܪܪܫܐ ܗܡܐ[30]ܗܠ[ܟ]ܐ [ܒ]ܬ [ܚܠ]ܪܫܟ .ܬܟܬ ܚܠ
ܚܠ[31] ؛ܫܫܡܟ ܬܟ ܗ[ܚܠ]ܪ ܗܫܡܒ ܠ[ܫܡ]ܐ ܐܟܟܚܠ ܐܟܟܬܠ ܐܟܟܬܠ[ܕ]ܐ ܟ؛ܚܝ[32]ܠ
ܟ [ܐܪ] ,ܡܐܬܠܚ ܐܡ [ܪ]ܫܠܟܪܟ [SGP f. 214r+221vA] ܫܪ ܕܫ[ܢ]ܫܟ ܬ ܟܪ
ܡܫܟܪ[34][ܟ]ܠܪ ܠ ܡܒܝ ܐܡ ؛[ܡ]ܐ[33]؛[ܢ]ܫ[ܝ]ܐ[ܟ] .ܪܫ[ܫܫܪ] ܪܫܬܟ
[traces circa 10 characters] ܗܦ ܚܠ ܠ ܬ[ܕ] ܠ ؛[35]ܪ[ܕ]ܫ ܪܫܟ ؛ ؛[ܡ]ܫ[ܟ]ܟ
ܪ ؛[36]ܪ[ܫ]ܟܟ [ܡ]ܠ ܪܫܟ ܫ ,ܡܐܟܪ [ܒ]ܬ ܟ ܐܡ ܪ[ܐ]ܟ ܫ ؛ܪ
؛ܫܫ[37]ܫ ؛ܫ[ܐ]ܪ ؛ܗ ؛ܟ ؛ܦ ؛ܗ ؛ܫ ؛ܫ ؛ܫ

within the head', 'the brain') with the secondary meaning 'pith'. It is used twice in chapter 21.6 'On date-palm' (12.151–152 Kühn) and in both cases its Syriac equivalent is not clearly readable in the SGP—it is either covered by the overtext (f. 166r+171v, col. B, line 34) or thoroughly washed off (f. 214r+221v, col. A, line 6), with the exception of the clearly readable first letter *mīm*. The only other case of the use of the expression ὁ τοῦ φοίνικος ἐγκέφαλος can be found in book 4, where the Syriac translation has ܡܚܐ ܕܬܡܪ (lit. 'the flower of the date-palm') with the word ܡܚܐ being used instead of the more generic term ܬܡܪ ('palm') in book 8.[46] In the Syriac treatise *On the Properties of Foodstuffs*, the term used to render palm pith is ܡܘܚ.[47] Bar Bahlūl describes it as ܠܒ ܕܬܡܪ ('the heart of the palm trees') and جُمّار ('the pulp of the palm tree').[48] However, several clues allow us to give ܡܘܚ as an equivalent of ἐγκέφαλος. First, ܡܘܚ means among other things 'brain' and 'marrow', i. e. ܡܘܚ ܕ ܓܪܓܝܪ ('the marrow of kernels') or here ܡܘܚ ܕ ܐܝܠܢ ('the marrow of the tree'). Second, in the *Syriac Book of Medicines*, ἐγκέφαλος is specifically rendered by ܡܘܚ.[49] Third, in the Syriac *Geoponica*, the term ܡܘܚ ܕ ܪܐܫ ('the brain of the head') is used to translate the same word.[50] Fourth, Galen in his treatise *Properties of Foodstuffs* explains the word ἐγκέφαλος as follows: 'The spinal marrow is similar to the brain and should not be called "marrow" (Ὁ νωτιαῖος μυελὸς ὁμογενὴς μέν ἐστιν ἐγκεφάλῳ, κακῶς δ' ὀνομάζεται μυελός).'[51] For ἐγκέφαλος, the Arabic translation gives the generic word موخ which shares the same root as the Syriac ܡܘܚ.[52]

In the second instance, Galen explains the meaning of the word ἐλάτη: ὃ δὲ καλοῦσιν ἐλάτην, τὸ ἁπαλὸν ἐκβλάστημα τοῦ φοίνικος ('the tender sprout of the date-palm, called spathe (*elátē*)'). The Syriac has ܕ[ܓ]ܚ ܕܚܠ ܐ [ܡ]ܚܚܡ ܡܚܕ [ܟ]ܠܕ ܠ ܕܡܝ ܕܘ ܐ[ܡ] [ܡ]ܡ[ܝ]ܐ[ܠ] ('their spathe which is called *elátē* is the tender sprout of the palm trees'). The word ܕܡܚܠ ('spathe') was recovered by using the regular expression function of Sedra IV on the ground of three hardly visible letters (ܡ[.]ܐ[.]). The same term is used in Ḥunayn's *Properties of Foodstuffs* in the chapters on the date-palm according to Galen and in MS D. Moreover, Bar Bahlūl gives الطلع as a counterpart for ܕܡܚܠ which is also present in the concise Arabic version of *Simple Drugs*.

In the third example, Galen explains how to use the spathe and the pith of the date-palm against liver and stomach disorders: ἔξωθέν τε καὶ ἔσωθεν ('externally and internally'). Here, we fill out the erased Syriac text as follows: ܐ[ܠ ܟ] ܡ ܚܬܡܚܐ ܕ ܠܕ ܟ ܡ[ܡܬܡ]ܚܐ ('and they [are placed] externally and taken [internally]'). On the one hand, the adverb ἔξωθεν comes generally with the verb ἐπιτίθημι (ܡܬ) in the passive form within books 6–8. Although there is no verb in the Greek text, the Arabic version gives فيما يوضع ('where they are placed'). We therefore suggest reading ܡܬܡܚܐ in the SGP. On the other hand, the only other occurrence of ἔσωθεν ('internally') in the bilingual corpus of books 6–8 is translated by ܟ ܠܐ that also renders εἴσω (twice). MS D, which abridges the passage, does not have any verb but gives the adverb in a similar way. It then offers further support to fill the gap with ܐ ܟ ܠܐ ('and internally').

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[46] About those two words and their related semantic fields, see Löw, *Aramäische Pflanzennamen*, 109–125. The word ܡܚܐ is also used in SGP, f. 144r+145v (book 4): ܡܘ[ܣ]ܐ ܡܚܐ ܕܬܡܪ ('the fruit of the palm trees and the wines') for ὁ τῆς φοίνικος καρπὸς καὶ τῶν οἴνων (11.648 Kühn).

[47] Cf. Hawley, Preliminary Notes, 93. MS D has ܠܒ ('heart').

[48] Cf. Duval, *Lexicon Syriacum*, col. 1750, lines 1–2. MS P has the identical Arabic word.

[49] Cf. Bhayro, The Reception of Galen's *Art of Medicine*, 135.

[50] Cf. Payne Smith, *Thesaurus*, col. 2033.

[51] *On the Properties of Foodstuffs* 3.10 (6.678 Kühn).

[52] The Arabic translator also makes a further distinction between موخ الرأس ('brain of the head') and موخ الصلب ('marrow of the spine'), cf. Ullmann, *Wörterbuch*, 216.

[Chapter 21.7]

[ζ΄. Περὶ φορβίου.] Φορβίου τῷ σπέρματι πρὸς λευκώματα χρῶνται μετὰ μέλιτος, ἀλλὰ καὶ σκόλοπας ἐξάγειν πεπίστευται. καὶ ἡ πόα δὲ ταὐτὸν τούτῳ δοκεῖ δύνασθαι, ἐξ ὧν δῆλον ὡς λεπτομεροῦς τε καὶ ἑλκτικῆς καὶ ῥυπτικῆς μετέχει δυνάμεως.

On sage.

One uses the seeds of sage with honey for leucoma,[53] but also it is believed to draw out thorns. The grass seems to have the same power as the seeds. Therefore, it clearly has a thinning, drawing, and cleansing power.[54]

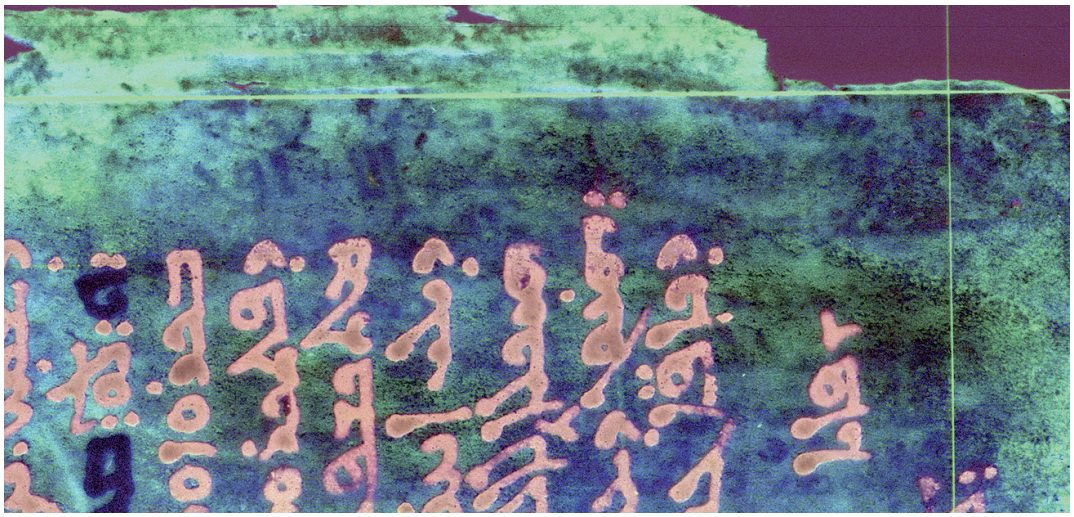

Fig. 4: portion of f. 214r+221vA, chapter 21.7. Undertext in black (© Owner of the Syriac Galen Palimpsest and the University of Manchester, Creative Commons Attribution 3.0 Unported Access Rights)

[ܚܠ ܐܪܚ̈ܝܐ[55]
[traces 1 line] ܚܕ ܪܥܝ ܗ[ܝܐ] ܕܗ ܪܒ ܐ[ܕ] ܕܒ. ܐܦ ܗܟ ܪܥ̈ܝ ܕܒ ܐܦ ܗ̈ܠ ܕ[traces 1 line] [ܬ]ܗ[traces 12–14 characters] [ܡ]ܚ ܐܪ
.ܐ[ܝ]ܪ ܐ[ܝ]ܪ ܐ[ܗ]ܐ ܐ[ܝ]ܪ

This entry partially falls within the damaged gutter area; therefore, it is not possible to estimate the space occupied by the title, which was reconstructed from the *pínax* (BL, f. 56v). A number of unreadable or poorly readable words have been mostly reconstructed from the Greek by using the bilingual corpus. This entry features the presence of a *hapax legomenon* λεύκωμα, the Syriac equivalent of which is only partially visible in the SGP. Although the lexicographically-accepted Syriac term for leucoma is ܚܝܪ̈ܐ,[56] in our case the readable suffix ܗܕ followed by the pronoun ܕܝ clearly indicate a feminine singular form. Thus we reconstructed the word as ‘ܗܕ[ܝ]ܐ (whiteness)’, a generic term without any medical connotation, followed by the specification ‘ܕܒ ܕܝ[ܐ] (which is in the eye)’.

[53] SGP: whiteness that is in the eye.
[54] SGP: thinning, cleansing, and drawing.
[55] Cf.ܐܪܚ̈ܝܐ Duval, *Lexicon Syriacum*, col. 1523, lines 26–27.
[56] Payne Smith, *Thesaurus*, col. 1232; Brockelmann, *Lexicon Syriacum*, 223.

[Chapter 21.8]

[η΄. Περὶ φοῦ.] Φοῦ. ἀρωματώδης πώς ἐστιν ἡ τῆσδε τῆς πόας ῥίζα, νάρδῳ παραπλησία τὴν δύναμιν, ἀλλ᾽ εἰς μὲν τὰ πλεῖστα καταδεεστέρα, προτρέπει δ᾽ οὖρα τῆς μὲν Ἰνδικῆς καὶ Συριακῆς νάρδου μᾶλλον, ὁμοίως δὲ τῇ Κελτικῇ.

On valerian.

Valerian. The root of this herb is somewhat spicy, similar in power to that of nard, although mostly weaker. It has, however, a more diuretic effect than Indian and Syrian nard, and is similar to the Celtic nard.[57]

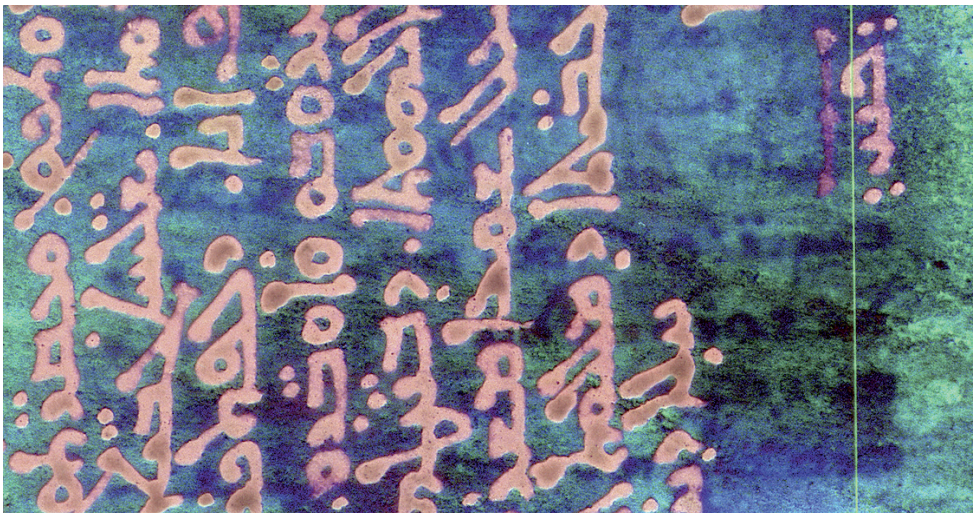

Fig. 5: portion of f. 214r+221vA, chapter 21.8. Undertext in black (© Owner of the Syriac Galen Palimpsest and the University of Manchester, Creative Commons Attribution 3.0 Unported Access Rights)

[حل هه[58]
.هه ܟ ܬ̈ ܟ ܕܟܬ̈ܚ ܗܠ ̣[ܕ̈]ܠ ̈ ̣ ̣[ ]ܡ ̣ ̣[ ]ܟ ̣ ̣ ̣

[Chapter 21.9]

[θ΄. Περὶ φύκου.] Φῦκος ὑγρὸν ἔτι καὶ χλωρὸν ἐξαιρούμενον τῆς θαλάττης, καὶ ψύχει καὶ ξηραίνει κατὰ τὴν δευτέραν τάξιν, ἔχει γάρ τι καὶ στρυφνὸν μετρίως.

On seaweed.

When seaweed is taken out of the sea whilst it is still wet and green, then it cools and dries in the second degree, for it also has some moderate astringency.

Fig. 6: portion of f. 214r+221vA, chapter 21.9. Undertext in black (© Owner of the Syriac Galen Palimpsest and the University of Manchester, Creative Commons Attribution 3.0 Unported Access Rights)

[ܦܘܩܣ ܡܢ ܦܘܩܣ ܠܛ]
ܟܬܒܗ [ܟܝܢ] [traces circa 10 characters] ܟܠܗ ܕ[ܟ]ܢ ܒ [...]ܗ [ܟ]ܥܒ ܕ
.ܗ[ܝ ... ܒ]ܕ ܐ[ܟ] ܗ [ܗ]ܘ] ܡ[ܝܢ ܟܠ

The entry on seaweed is present in MS D (f. 64r); however, it differs considerably from Sergius' translation. The title was reconstructed from the *pínax* (BL, f. 56v), taking into account one full line of unreadable rubric in the SGP (approx. 18–20 characters). It is not particularly clear which sort of seaweed is discussed in this entry. The Syriac transcription ܦܘܩܣ is recorded in Bar Bahlūl's *Lexicon* (variant: ܦܘܩܣ ܕܡܪܝܐ) as a form used by Sergius for the Syriac ܡܪܝܘܬܐ (literally 'redness'; variant: ܡܪܝܢܐ).[62] Indeed, the latter is not present in Sergius' translation of books 6–8; furthermore, while pointing to the red colour of the seaweed, the word itself contradicts Galen's description. This may be the reason why Sergius has chosen to repeat the transcription of the Greek word as the second component in the title, where we would expect to see the existing Syriac equivalent.

[62] Duval, *Lexicon Syriacum*, col. 1521, lines 14–16; Payne Smith, *Thesaurus*, col. 3070.

[Chapter 21.10]
[ι΄. Περὶ φυλλίτιδος.] Φυλλῖτις, στρυφνῆς οὖσα ποιότητος, οὐκ ἀπὸ τρόπου διαρροίας τε καὶ δυσεντερίας ὀνίνησι πινομένη.

On hart's-tongue
Since hart's-tongue has an astringent quality, it likely helps[63] against diarrhoea and dysentery when drunk.

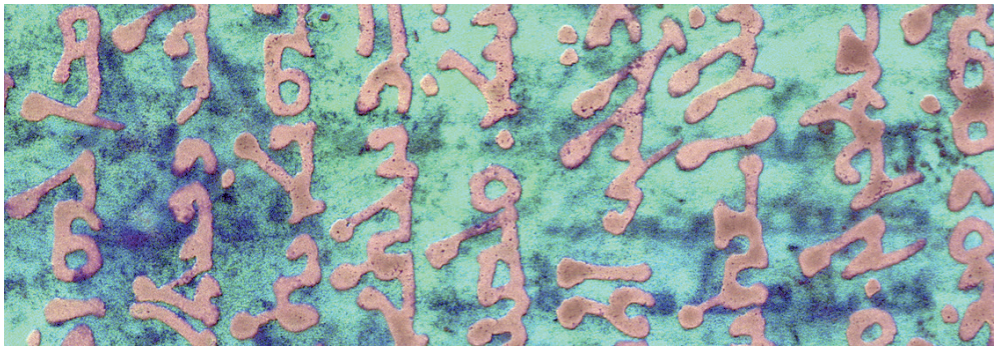

Fig. 7: portion of f. 214r+221vB, chapter 21.10. Undertext in black (© Owner of the Syriac Galen Palimpsest and the University of Manchester, Creative Commons Attribution 3.0 Unported Access Rights)

[64ܫܡܠܗ ܚܠ] [SGP f. 214r+221vB]
.ܟܚ ܒܟܐ ܟܠܐ ܟܬܒܐ [ܐܪ] ܟܫܟ ܟܐܪܒ ܟܐ ܚܒܠ ܟ[ܝ]ܟ ܟ ܐ

The heading of this entry is reconstructed from the *pínax* taking into account the space of approximately 8–10 characters within the last line of column A. At the end of line 1 and at the beginning of line 2 in column B one can read the expression ܟܐܪܒ ܟܐ (‘wrongly/unlikely’) which probably reflects Sergius’ misunderstanding of Galen’s οὐκ ἀπὸ τρόπου (‘not unlikely’; the same wording in MS U, f. 232v); as a result, the whole phrase acquired in Syriac the opposite meaning to the original text. The expression οὐκ ἀπὸ τρόπου is quite rare in the Galenic treatise and can only be found in book 1, chapter 9 (11.397 Kühn).

[Chapter 21.11]
[K xii.153] [ια΄. Περὶ φύλλου μαλαβάθρου.] Φύλλον μαλαβάθρου νάρδῳ παραπλήσιόν ἐστι τὴν δύναμιν.

[K xii. 153] On malabathron leaves.
Malabathron leaves have a power similar to nards.

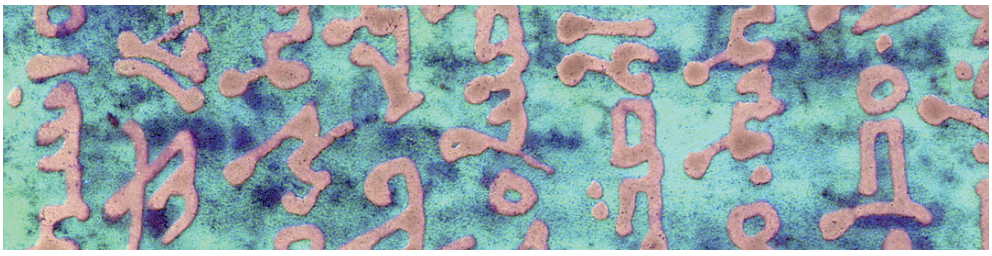

Fig. 8: portion of f. 214r+221vB, chapter 21.11. Undertext in black (© Owner of the Syriac Galen Palimpsest and the University of Manchester, Creative Commons Attribution 3.0 Unported Access Rights)

[63] SGP: it is unlikely to help (?).
[64] Cf. ܫܡܠܗ: Duval, *Lexicon Syriacum*, col. 1510, lines 23–26.

[ܚܠ ܗܠܐ ܐܝܒܛܠܟܐ][65]
.[ܟܐ ܡ]ܢܢܠ ܟܐ ܫܠܫ

Virtually the same entry is included in book 7 under the title μαλαβάθρου φύλλον (12.66 Kühn). The Syriac title in book 7, if compared with book 8, is apparently much more explicit, containing three components: the transliteration of the Greek plant name (ܐܠܐ ܐܝܒܛܠܟܐ), the Syriac literal translation (ܐܝܒܛܠܟܐ ܟܝܠ, introduced by ܕܢ ܐܡ ‘that is’) and the Syriac equivalent (ܐܠܐ, introduced by ,ܫܐܒܟܢ ‘that is’).[66] In book 8 (SGP, f. 214r+221v, col. B), approximately 6 characters can fit in the rubric space at the end of line 4 with a further 8–10 characters at the beginning of line 5, which means that the title is far less complete. Most probably, it only contained the first component, that is the Syriac transliteration, which we reconstructed in our edition accordingly. Unlike book 8, the entry in book 7 is more specific about nard: ‘Μαλαβάθρου φύλλον νάρδου στάχυϊ παραπλήσιόν ἐστι τὴν δύναμιν (Malabathron leaves have a power similar to the stalk of nard).’ The stalk of nard is also described in its own right in book 8 (12.84–85 Kühn). The Syriac equivalent used in both cases is ‘ܕܢܪܝ ܒܛܠ (the stalk of nard)’ (BL, f. 57r; SGP, f. 192v+193r, col. A). This form, however, is not included in the entry edited above, which reflects the wording in the Greek text. The Syriac entry entitled ܐܝܒܛܠܫܐ ܐܠܐܦ is present in MS D (f. 64r–v), on which we partially based our reconstruction.

[Chapter 22.1]
[α΄. Περὶ χαλβάνης.] Χαλβάνη ὀπός ἐστι ναρθηκώδους φυτοῦ, μαλακτικῆς τε καὶ διαφορητικῆς ὑπάρχουσα δυνάμεως. καὶ εἴη ἂν ἐν μὲν τῷ θερμαίνειν ἐκ τῆς τρίτης που τάξεως ἀρχομένης ἢ τῆς δευτέρας συμπληρουμένης, ἐν δὲ τῷ ξηραίνειν ἐκ τῆς δευτέρας ἀρχομένης.

On galbanum
Galbanum is the resin of fennel plants. It has a softening and sweat-inducing power. It probably warms[67] in the beginning of the third or the end of the second degree; and dries in the beginning of the second [degree].

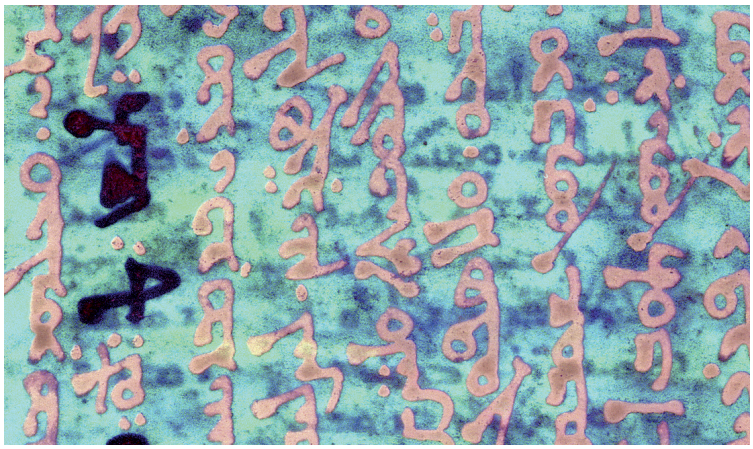

Fig. 9: portion of f. 214r+221vB, chapter 22.1. Undertext in black (© Owner of the Syriac Galen Palimpsest and the University of Manchester, Creative Commons Attribution 3.0 Unported Access Rights)

[65] Cf. ܐܠܐ ,ܫܐܒܟܢ ܐܝܒܛܠܫܐ ܟܝܠ ܕܢ ܐܡ ܐܠܐ ܐܝܒܛܠܟܐ ܚܠ] BL, f. 50r; not present in SGP. Cf. Payne Smith, *Thesaurus*, coll. 3146–7.

[66] On the structure of the chapter titles see Bhayro, Syriac Medical Terminology, 162–165; Calà and Hawley, Transliteration versus Translation, 170–172.

[67] SGP: has the warming power.

[ܚܠ ܟܠܒܢܝ̈ܬܐ ܡܫܚܪ̈ܐ ܟܠܟ ܚܠ]
[.....][68] ܡ[ܫ]ܚ̈ܪܐ [ܟ]ܠ̈ܒ̈ܢܝ̈ܬ̈ܐ ܟ[ܠ]ܟ ܚ̈ܠ̈ܒ̈ܢ̈ܝ̈ܬ̈ܐ ܡ̈ܢ̈ܐ ܟ̈ܠ̈ܫ̈ܠ̈ܫ̈ܠ̈ܐ ܟ̈ܚ̈ܬ̈ܟ̈ܐ [ܟ̈ܠ̈ܫ̈]
.ܟ̈ܐ̈ܥ̈ܥ̈ܦ̈ܟ̈ܐ ܟ̈ܚ̈ܬ̈ܟ̈ܐ
[ܡ̈ܚ̈ܠ]ܥ̈ܐ ܟ̈ܝ ܐ̈ܟ̈ [ܟ̈ܝ]ܥ̈ܐ ܕ̈ ܟ̈ܚ̈ܠ̈ܫ̈ܐ ܐ̈ܫ̈ ܟ̈ܚ̈ܟ̈ܫ̈ ܚ̈ܠ ܟ̈ܚ̈ܟ̈ܫ̈ [....] ܟ̈ܫ̈ܐ ܫ̈ܡ̈ܚ̈ܟ̈
.[ܟ̈ܥ̈ܐ]ܠ ܕ̈ [ܝ̈]ܚ̈ܐ ܐ̈ܫ̈ [....] ¥[ܡ̈]ܚ̈ܐ [..]ܠ ̈[ܝ̈ܚ̈ܐ] ܐ̈ܫ̈

Χαλβάνη is a West Semitic loanword in Greek, cf. Hebrew חלבנה in Ex 30:34 being a derivative of 'חלב (milk)'.[69] The Aramaic form חלבניתא (Syriac ܟ̈ܚ̈ܠ̈ܒ̈ܢ̈ܝ̈ܬ̈ܐ) is obviously of the same origin, pointing out the milky nature of the juice (or resin) of the root of the fennel plant.[70] Interestingly, the entry ܟ̈ܚ̈ܠ̈ in Bar Bahlūl's *Lexicon* quotes the first phrase of Sergius' translation verbatim, which allowed us to restore parts of the poorly-readable text in SGP.[71] In Bar Bahlūl's description, the first word following the title reads 'ܟ̈ܐ̈ܥ̈ܦ̈ܟ̈ܐ (and the sort [of the plant])', which does not reflect the Greek 'ὀπός (resin)'. The latter is quite commonly used in books 6–8 and rendered as either 'ܟ̈ܝ̈ (juice)' or 'ܟ̈ܚ̈ܠ̈ (milk)'. Therefore in this case we did not follow Bar Bahlūl in our reconstruction, although otherwise the title and the first sentence fully accord with the entry in his *Lexicon*. The Galenic chapter on galbanum is related to the description of fennel (νάρθηξ), also in book 8 (12.85 Kühn), where the Syriac equivalent of the plant name ܡ̈ܚ̈ܠ̈ܫ̈ܐ can be found in the title (BL, f. 57v; SGP, f. 192v+193r, col. B). The entry is also present in MS D (f. 64v), albeit in an abridged form, and mentions the powers of the substance but omits the degrees to which they are changed.

[Chapter 22.2]

[β΄. Περὶ χαμαίδρυος.] Χαμαίδρυς ἐπικρατοῦσαν ἔχει τὴν πικρὰν ποιότητα, ἔστι δὲ καὶ δριμεῖά πως. ἐξ ὧν δηλονότι δεόντως σπλῆνα τήκει καὶ οὖρα καὶ καταμήνια κινεῖ καὶ πάχος χυμῶν τέμνει, καὶ τὰς ἐν τοῖς σπλάγχνοις ἐμφράξεις ἐκκαθαίρει. καὶ θείη ἄν τις αὐτὴν ἐν τῇ τρίτῃ τάξει κατὰ τὸ ξηραίνειν καὶ θερμαίνειν, καὶ πλέον γε κατὰ τὸ ξηραίνειν ἢ θερμαίνειν.

On true germander

True germander has an overpowering bitter quality, and also is somewhat pungent. Therefore it clearly melts the spleen, stimulates urine and menses, cuts the thickness of humours, and also cleanses blockages in the intestines. One could say that it dries and warms in the third degree, although it dries more than it warms.

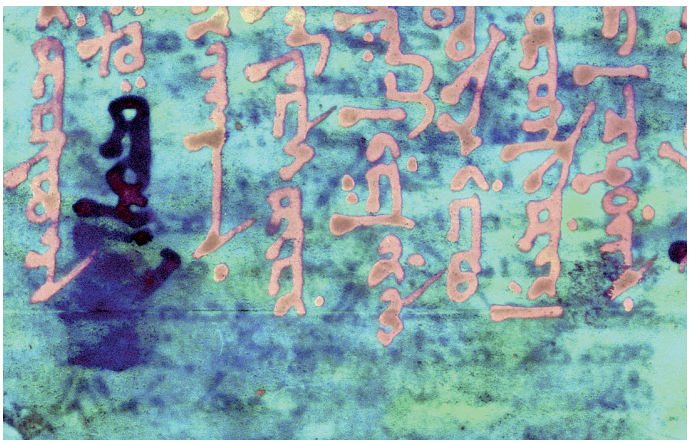

Fig. 10: portion of f. 214r+221vB, chapter 22.2. Undertext in black (© Owner of the Syriac Galen Palimpsest and the University of Manchester, Creative Commons Attribution 3.0 Unported Access Rights)

[68] Cf. ܟ̈ܐ̈ܥ̈ܦ̈ܟ̈ܐ: Duval, *Lexicon Syriacum*, col. 894, line 15.

[69] Masson, *Recherches*, 60; Beekes, *Etymological dictionary*, 1609; Chantraine, *Dictionnaire étymologique*, 1242; Brown *et al*., *A Hebrew and English Dictionary*, 317.

[70] Löw, *Aramäische Pflanzennamen*, 163; Payne Smith, *Thesaurus*, col. 1275.

[71] Duval, *Lexicon Syriacum*, col. 894, lines 15–16.

[حل حمكنحمح][72]
[ركا] حنكم حمد : ممحم حم ٦٦ ثهلهنك حمد ٦٦ ثهلهنك [ركا] ٥٥ حمد [م]لا[م] حمه .ركهمهنك حمد ٦٦ ثهلهنك [ركا] ركحمه .ثهمحا ركهمحمح [مهمحه]ه ركهمحه ركهنعهمك [حنحمه] ركسلم [نع]حمه هنركه٦ [...] ركلهك ٦ركه[حلم] [traces 8–9 characters] ممهمهك [...] .ركحمحك ٦ركحم [...] ركهمحم

[Chapter 22.4]

[δ΄. Περὶ χαμελαίας.] Χαμελαίας τὴν πικρὰν ἐπικρατοῦσαν ἔχει ποιότητα. διὸ καὶ τὰ ῥυπαρὰ λίαν ἕλκη καὶ ὅσα μεγίστας ἐσχάρας ἔχει, μετὰ μέλιτος ἀνακαθαίρειν δύναται.

On spurge-olive

Spurge-olive has a sharp quality that dominates. Therefore, with honey it can clean very dirty wounds and those with extremely large scabs.

[حل ...][75]
(poor readability)
[... ..] ܗ[ ]ܬ[76]. [traces circa 2 lines] ܐ[ ]ܝ ܕ ܐ[77].]ܐ[78

The *pínax* includes the full title, ܙܝܬܐ ܪܘܡܝܐ ,ܣܡܪܘܬܐ ܕܡܫܚܐ. In SGP, however, the rubric space is limited to approximately 8 characters, therefore only the first element in the title was restored in the edition. This entry is attested in the Arabic version of *On Simple Drugs* (P, f. 115r–v), where the Arabic equivalent of the plant name is مازريون. In both Bar ʿAlī's *Syriac-Arabic Glosses* and Bar Bahlūl's *Lexicon*, the Arabic term corresponds to ܙܝܬܐ ܪܘܡܝ (‘wild olive’), as in the BL *pínax*.[79] There is, however, a certain confusion around this term. Bar ʿAlī relates it also to ܩܘܣܛܐ ܕܡܨܪܝܐ (literally ‘Egyptian cyclamen’),[80] which corresponds to ‘chameleon’ (χαμαιλέων; 12.152 Kühn) in Sergius' translation (see chapter 22.6 below). Bar Bahlūl, in turn, also equates ܙܝܬܐ ܪܘܡܝ with ܐܪܓܘܢܐ (‘chameleon’).[81]

In the SGP only a few words are decipherable, mostly with the help of the Arabic text. For instance, the verb ἐπικρατέω is often rendered by a personal pronoun prefixed by ܕ with the adverb or the adjective ܣܓܝ. The same construction is used in the Arabic translation (كثير ... في هذا).

[Chapter 22.5]

[ε΄. Περὶ χαμαιλεύκης.] Χαμαιλεύκη θερμὴ τὴν δύναμίν ἐστι κατὰ τὴν τρίτην που τάξιν καὶ ξηρὰ κατὰ τὴν πρώτην.

On colt's-foot.

Colt's-foot has a warming power roughly in the third degree and drying in the first.

[حل ...]
(poor readability)
[traces circa 3 lines] ܫ

Owing to the poor state of preservation, the text of this entry is not readable in SGP. It is not included in MS D either, but is present in Bar Bahlūl's *Lexicon* under the title ܒܪܡܛܐ (variant: ܒܪܡܛܘܢܝܐ).[82] The latter includes a Syriac translation of Dioscorides' chapter dealing with this plant (*On Medicinal Substances* 1.124; 25.610 Kühn, here: χαμαιπεύκη). R. Payne Smith suggested that Bar Bahlūl himself may have translated the Greek passage into Syriac.[83] It is, however, more likely that the lexicographer used an existing translation, probably made or transmitted by Ḥunayn, as follows from Bar Bahlūl's reference to ‘the teacher’.[84]

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75 Cf. ܐܪܡܛܐ : Duval, *Lexicon Syriacum*, col. 860, line 5; ܐܪܓܘܢܐ (variant: ܐܪܟܘܢܐ) : Duval, *Lexicon Syriacum*, col. 904, lines 6–7

76 P: في هذا من المرّ مقدار كثير

77 Cf. διὸ καὶ... δύναται; P: فهو لذلك ممّا يمكن.

78 Cf. μεγίστας; P: العظيمة.

79 Duval, *Lexicon Syriacum*, col. 688, lines 5–6; Payne Smith, *Thesaurus*, col. 1119; Löw, *Aramäische Pflanzennamen*, 136.

80 Payne Smith, *Thesaurus*, col. 956; Löw, *Aramäische Pflanzennamen*, 127–128.

81 Duval, *Lexicon Syriacum*, col. 904, lines 6–7.

82 Duval, *Lexicon Syriacum*, col. 860, lines 11–14.

83 Payne Smith, *Thesaurus*, col. 1661.

84 On Bar Bahlūl's use of existing Syriac translations of Greek authors and his *ad hoc* Arabic translations, see Pormann, *The Oriental Tradition*, 14–20.

[Chapter 22.6]

[στ΄. Περὶ χαμαιλέοντος.] Χαμαιλέοντος ἡ ῥίζα τοῦ μὲν μέλανος, ἔχει τι δηλητήριον, ὅθεν ἔξωθεν ἡ χρῆσις αὐτοῦ πρὸς ψώρας καὶ λειχῆνας καὶ ἀλφοὺς καὶ ὅλως ὅσα ῥύψεως δεῖται καὶ τοῖς μαλακτικοῖς καὶ διαφορητικοῖς μίγνυται φαρμάκοις. καὶ τὰ φαγεδαινικὰ τῶν ἑλκῶν ἰᾶται καταπλασθεῖσα. ἔστι γὰρ ξηρὰ κατὰ τὴν τρίτην ἤδη που τάξιν. ἐν δὲ τῷ θερμαίνειν ἐκ τῆς δευτέρας συμπληρουμένης. ἡ δὲ τοῦ λευκοῦ χαμαιλέοντος ῥίζα πρὸς ἕλμινθας πλατείας δίδοται πλῆθος ὀξυβάφου μετ᾽ οἴνου αὐστηροῦ. προσφέρουσι δ᾽ αὐτὴν καὶ τοῖς ὑδερικοῖς παραπλησίαν οὖσαν καὶ αὐτὴν τῇ κράσει τῇ τοῦ μέλανος ῥίζῃ, πλὴν ὅσα πικρότερα ἐκείνης ἐστίν.

On chameleon

The root of the black chameleon[85] has some noxious property. Therefore, it is used externally for scabs, lichens, dull-white leprosy, and in general for conditions requiring cleansing with[86] softening and sweat-inducing drugs. It also cures cancerous wounds when applied as a poultice. For it is dry, perhaps even in the third degree, and warming in the end of the second degree. The root of the white[87] chameleon is given[88] against the broad intestinal worms in the quantity of one *oxýbaphon*[89] [ca. 30ml], with dry wine. One also offers it to patients suffering from dropsy, because it is similar to the mixture of the root of black chameleon, except that the former is sharper than the latter.[90]

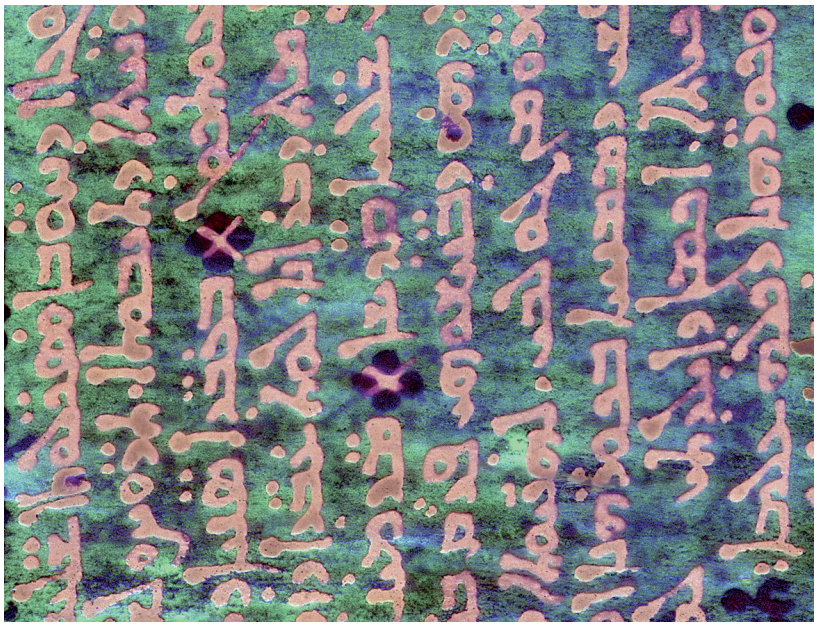

Fig. 12: portion of f. 214r+221vB, chapter 22.6 (beginning). Undertext in black (© Owner of the Syriac Galen Palimpsest and the University of Manchester, Creative Commons Attribution 3.0 Unported Access Rights)

85 SGP: ‘the root of this if [...] black’.
86 SGP: ‘for all the pains requiring cleansing; it is mingled with’.
87 SGP: ‘other’.
88 SGP: ‘is taken’.
89 SGP: ‘handful/a measure’.
90 SGP: ‘of the root of the other, unless it is sharper’.

[ܐܟܠܦܘܣ ܐ ܐܟܪܝܛ ܫܘܟܐ ܕ[91ܐܣܛܘ ܠܗ]
ܐܢ [ܠ]ܗ [ܐ]ܣ ܕ[92...] ܘܡܐ ܐܡ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ
ܐ[ܢ] ܐ[93....] ܗ[ܠ] ܐܟ[ܐ]ܣ ܡ[ܐ]ܟܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ
ܐ[ܣ]ܛ ܐ[94]. ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ
ܐ[ܣ]ܛ ܐ[95] ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ
ܐ[ܣ]ܛ ܐ [SGP, f. 214v+221rA] ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ
ܐ[ܣ]ܛ ܐ [BL, f. 73r] ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ[96].
ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ[97] ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ
ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ.

The rubric space in the SGP spans approximately one line and is large enough for completing the title from the *pínax* in BL (f. 57r). The black chameleon is considered a medicine having a poisonous root by Galen and Dioscorides (*Medicinal Substances* 3.9). The word ܐ[ܣ]ܛ refers to a wide range of plants.[98] Bar Bahlūl devotes two entries to it. In the first one, he identifies ܐ[ܣ]ܛ with ,ܐ[ܣ]ܛ that may designate Alpine cyclamen. He also assimilates ܐ[ܣ]ܛ ܐ[ܣ]ܛ to ܐ[ܣ]ܛ ܐ[ܣ]ܛ which is black hellebore.[99] In the second entry, Bar Bahlūl refers to five other plants including ܐ[ܣ]ܛ[100], the same name that occurs in Sergius' translation for black chameleon.

The end of this chapter in Syriac is available both in SGP and BL. This allows for a brief comparison and shows that the palimpsest contains a few variant readings, including one where BL has ܐ[ܣ]ܛ ('handful') for the Greek *oxýbaphon* designating a measure of weight. Here, SGP reads ܐ[ܣ]ܛ, which is obviously a scribal error.

CONCLUSION

As we have just demonstrated, in the case of f. 214r+221v, which covers the part of book 8 missing from BL, the image analysis and the new software GalenQt provided a noticeable support for the recovery of the lost text. The best available image acquired with a traditional method was the result of the CVA-processing of 8 bit multi-spectral images using a combination of Matlab and ImageJ (performed in September 2016). It provided around 48% readability (723 readable characters out of an average of 1,500 per page). We used the new software to enhance the readability and recover more undertext. The operations in GalenQt were performed primarily on the 16 bit raw multi-spectral images of the folio. The images with direct LED illumination (the first 13 images in each set) proved to be more useful than those acquired with the raking light illumination (images 14–17), while the fluorescence images (images 18–23) provided more information on the undertext in comparison with the others. The latter allowed us effectively to pick up points from the undertext in less readable areas, such as the gutter. Based on this, we successfully performed a supervised dimensional reduction analysis (LDA) which provided the best channel separation and enhanced readability of the undertext to 63% (941 readable characters out of ca. 1,500). On the basis of this enhanced text, we were able to reconstruct the problematic portion in book 8 of the Syriac version of *Simple Drugs*.

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[91] Cf. ܐ[ܣ]ܛ, ܐ[ܣ]ܛ : Duval, *Lexicon Syriacum*, col. 859, lines 27–28 – col. 860, lines 1–4; Payne Smith, *Thesaurus*, col. 1661.

[92] The conditional clause does suggest a verb in Syriac. We can envisage a possible reconstruction with ܐ[ܣ].

[93] There is enough room to fill the gap with ܐ[ܣ]ܛ or ܐ[ܣ]ܛ, both possible translations of ψώρα in the bilingual corpus.

[94] We find a quite similar rendering in book 6 (cf. BL, f. 24v, 11.864 Kühn): ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ ܐ[ܣ]ܛ ܐ (τά τ' ἄλλα τὰ ῥύψεως δεόμενα).

[95] The word κατάπλασμα is generally written with ܒ in MS BL and SGP, more rarely with ܝ.

[96] ܐ[ܣ]ܛ] BL : ܐ[ܣ]ܛ SGP.

[97] ܐ[ܣ]ܛ] BL : om. SGP.

[98] Löw, *Aramäische Pflanzennamen*, 127–128.

[99] Duval, *Lexicon Syriacum*, col. 595 line 20.

[100] Duval, *Lexicon Syriacum*, col. 596 line 24.

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Doug Emery

Reflections on the Digital Palimpsest: Data Modelling and Data Management

INTRODUCTION

The author began data management work on spectral imaging projects in 2005, with the Archimedes Palimpsest Project (APP). Since then, he has worked on several such projects, including the Syriac Galen Palimpsest (SGP, 2009–2010) and the Sinai Palimpsests Project (SPP, 2011–2015). The data management approaches the author employed beginning in 2005 with the Archimedes Palimpsest Project evolved and changed over the next 10 years. This paper will summarize that work from a data management point of view and give a detailed example of the relationship between data management, metadata, and data modelling that encapsulates this change in approach.

SUMMARY PROJECT HISTORY

The table below summarizes four of the projects the author worked on between 2005 and 2015, beginning with the Archimedes Palimpsests Project and ending with the Sinai Palimpsests Project. The Walters Art Museum's ongoing manuscript digitization is added here because of the role it played in the development of the methods used for the Sinai Palimpsests Project.

	Archimedes Palimpsest	**Syriac Galen Palimpsest**	**Walters Art Museum MSS**	**Sinai Palimpsests**
Image type	Spectral	Spectral	Colour archival	Spectral
Start date	1998	2009	2008	2011
Data publication	2008	2010	2010	2015
Number of MSS	1	1	475+	74
Capture images per folio side	16	23	1	31/33
Processed images per folio side	3	5+	N/A	ca. 30+
Data set size	1TB	0.37 TB	19TB	50TB
Image sequences	180	242	N/A	6,944
Distinct images	4,006	6,268	ca. 142,000	ca. 430,000
Data management methods	Stokes IWS; Spreadsheets; Ruby scripts; Unix shell scripts	MegaVision PhotoShoot; MSIMM; Ruby scripts; Unix shell scripts	Stokes IWS; WECT; Ruby scripts; Unix shell scripts; Bagger	MegaVision PhotoShoot; KatIkon; Spreadsheets; Ruby scripts; Unix shell scripts

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Explanatory Notes

Capture images

The *Archimedes* data set includes images captured apart from the spectral images in these data sets, including digital versions of Johan Ludwig Heiberg's 1906 photos of the manuscripts and X-Ray Fluorescence (XRF) images captured at the Stanford Linear Accelerator Center (SLAC).[1]

The *Galen* data set includes images of additional leaves of the manuscript not captured in 2009/2010. These are of leaves now at the Houghton Library at Harvard University, the Vatican, the Bibliothèque nationale de France, and St. Catherine's Monastery in the Sinai.[2]

Processed images per side

For each of the spectral imaging projects a fixed number of processed images were produced by Keith Knox using unsupervised batch processing methods. In addition to these images, special supervised statistical processing methods were applied to those images not amenable to the unsupervised processing. This work was done by William Christens-Barry, Roger Easton and students under his supervision, and David Kelbe.

Number of manuscripts

The Walters Art Museum has an ongoing operation to digitize and publish images of its medieval and rare manuscripts. 474 manuscripts with images are now online at the Digital Walters website.[3]

Data management methods

- *Stokes IWS*.[4] The 2007 reimaging of the *Archimedes Palimpsest* used the database-driven, Stokes Imaging Workflow Solution (IWS) to manage file naming at capture time and record camera configuration and capture information. IWS accepts input spreadsheets containing filenames and metadata and records capture details, which can then be exported as Excel spreadsheets for use in other processes. These features were used in the Archimedes Project and the ongoing manuscript digitization efforts at the Walters Art Museum.
- *MegaVision PhotoShoot*.[5] In 2009, the MegaVision PhotoShoot software allowed users to enter the base names of capture files by hand. The 2011 version of the software accepted a formatted text file with the base name of each capture file and metadata to add to each image's header. Both of these systems were integrated with lighting systems developed by William Christens-Barry.
- *MSIMM*. The Multi-Spectral Image Manager ('Miss M.') was a first attempt at building a Ruby on Rails web application to manage the image metadata for a spectral imaging project.[6] It generated filenames, tracked capture images and processed images, and generated data files used to add metadata to image headers and assemble archival packages of data. The *Syriac Galen Palimpsest* metadata was managed by MSIMM.
- *WECT*. The Walters Electronic Cataloging Tool is used by the Walters Art Museum to manage manuscript imaging metadata and manuscript cataloguing and publication on its Digital Walters website (http://thedigitalwalters.org).
- *KatIkon*. The KatIkon built on the concepts of MSIMM and added a component for manuscript cataloguing and undertext identification. KatIkon was the data management heart of the Sinai Palimpsests Project.
- *Ruby and Unix shell scripts*. On all projects, custom scripts were used to collect, record, and manage metadata and to assemble data and metadata for delivery and archiving. The scripts were written in the Ruby programming language and the Bash shell script language, with heavy reliance on the utility ExifTool.[7]
- *Bagger*. The Walters Art Museum packages its image data using the BagIt protocol, which is used to create verifiable packages of digital data for delivery and archiving.[8] They use the Library of Congress Bagger application to create BagIt 'bags'.[9]

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[1] Noel, Introduction; Bergmann, Imaging with X-Ray Fluorescence.
[2] *The Syriac Galen Palimpsest.*
[3] *The Digital Walters.*
[4] *Stokes Imaging Inc: IWS.*
[5] *MegaVision Archival Photography.*
[6] *Ruby on Rails.*
[7] *Ruby Programming Language*; *GNU Bash*; *ExifTool* by Phil Harvey.
[8] Kunze *et al*., *The BagIt File Packaging Format (V1.0).*
[9] *The Bagger Application Packages Data Files According to the BagIt Specificatio*n.

As can be seen from the chart, the trend over time was an increase in the number of manuscripts that were imaged and the number of images produced per manuscript. While the data and metadata for the Archimedes and Galen Projects could be managed by one person, with the Walters project and the Sinai Palimpsests Project the duration and size of the projects moved beyond the management capability of one person, requiring personnel in multiple roles, working in a distributed fashion. While data and metadata collection could be managed with spreadsheets in the Archimedes Project, the Walters project demanded a different approach. For that project, a data and cataloguing management web application was developed, along with a small suite of scripts, to manage the Walters image data and metadata and detailed manuscript-level and page-level cataloguing information. This is Walters Electronic Cataloging Tool, or WECT, which was built in the Ruby on Rails web application framework. The WECT orchestrates data management for the project, collecting shoot list information to be uploaded to the camera software, Stokes IWS; managing post-capture technical metadata for all images and their derivates; and integrating detailed cataloguing with image data for publication as Text Encoding Initiative (TEI) compliant XML manuscript descriptions.[10] Distributed staff and project members use the WECT to manage image and cataloguing metadata and to publish that data on the Digital Walters website.

The ideas employed for the WECT were adapted for KatIkon, the tool used by the Sinai Palimpsests Project for data management, metadata management, manuscript cataloguing, and palimpsest undertext characterization. KatIkon offers these features:

- Collection of manuscript and folio metadata, with an emphasis on palimpsest description
- Creation of Shoot Lists used by the MegaVision PhotoShoot software to manage imaging workflow, filenames, and metadata
- Collection of metadata for capture and processed images for linking to manuscript folios
- The assignment of folios and images to scholars charged with identifying palimpsest undertexts
- The creation of image lists based on those assignments for packaging to be delivered to scholars
- Collection of undertext identifications made by the scholars and the grouping of undertexts belonging to the same source manuscript (e.g., all the undertext folios belonging to a single copy of the Gospel of St. Mark)
- The creation and export of files used to assemble archival packages of images and CSV and TEI manuscript descriptions for over- and undertext manuscripts

KatIkon was supported by two sets of scripts, spindle and sp-boxer. Spindle facilitated the delivery and receipt of data for the Sinai Palimpsests Project: validating and packaging images for delivery, unpacking and validating images upon receipt, and extracting metadata from received images for upload to KatIkon.[11] Sp-boxer (not publicly available) used metadata and package creation instructions downloaded from KatIkon to build packages for delivery to scholars and for long-term preservation.

Both the WECT and KatIkon manage the complete life cycle of imaging and cataloguing, from the creation of lists of shots before capture to the final publication of images with complete technical and content descriptive metadata. To serve the complexities of spectral imaging and palimpsest description and text identification, KatIkon extended the WECT model in interesting ways.

PROCESS, DATA MODELLING, AND THE NAMES OF FILES

The following discussion looks at the practice of file naming, work processes, and data modelling. The case is made that good data management practice begins with the intended result and destination for that data. This practice also takes into account the scope of the project in terms of the quantity of data to be managed and the number of tasks and roles involved from the time of the data's creation to its final publication.

The question of file names in a spectral imaging project of the size of the Sinai Palimpsests Project is a critical one. Over 220,000 images were captured in the Sinai over a period of four years. They were brought to the United States in batches on hard drives and then distributed to project scientists for processing. The processed images were returned to the data operations manager to be added to the larger data set, and distributed to

[10] *10 Manuscript Description – The TEI Guidelines.*
[11] *Sinai Palimpsests Project Data Delivery and Receipt.*

scholars for undertext identification work. The scholars using those files entered undertext identifications into KatIkon. When the imaging, processing, and cataloguing for a manuscript was compete and the data ready for archiving and publication, all the correct files, capture and processed, had to be assembled in a directory with metadata files linked to those images. Some manuscripts had over 10,000 associated images, all of which had to be assembled and linked to the metadata. The final package of data is a fully-integrated, verifiable archive of a manuscript's palimpsest folio images and descriptive and technical metadata that is created often years after the leaves were first digitized. During that time the integrity of the data and its validity has to be assured and monitored.

A key component of the management of this data comes down to filenames, their consistent naming and handling. The currency of a spectral imaging project is the files, one for each exposure of a recto or verso side along with multiple processed images. In the case of the Sinai project, each folio side had thirty-three capture images and nearly the same number of processed images.[12] On the projects discussed here, capture images were distributed to project scientists in batches numbering thousands of images. Generated processed files were returned to the data administrator to be added to the larger data set. The files had to have unique names so that they could be distinguished from one another, by content, by mode of capture, by processing method.

A common approach for naming images is to use the folio number or numbers of the object imaged, the mode of capture or processing, and an image sequence serial number. Note the following filenames from the Archimedes Palimpsest Project:

103r-097v_Arch42r_Sinar_LED365_01_raw.tif
103r-097v_Arch42r_Sinar_LED445_01_raw.tif

The first file is an image of *Archimedes Palimpsest* overtext bifolio 103r+97v, with undertext folio side designated Archimedes 42r. It was captured using a Sinar camera and illuminated by 365 nanometer LED lights. It was the first such exposure captured (indicated by the '01'), was derived from a camera 'raw' file, and is in the TIFF image format. Each of these encoded values is, of course, shorthand for more complex data. The second file is identical, except that it was illuminated with 445 nm LED lights. Every image file in the Archimedes data is similarly named, with the name segments changed according to subject, capture, or processing method, and so on. This file naming convention was developed for a project that imaged one manuscript. To extend this approach to multiple manuscripts, one would need to add a call number or shelfmark at the beginning. Even more data can be added to filenames as a storage mechanism for persistent and transient information.

The use of filenames to store information, especially content information, is problematic in projects of any size for which automated methods are used to associate complex metadata with images, and to manage and publish that data in bulk. Information like the identification of a folio side or a manuscript via its shelfmark can be incorrect (and at times indeed is incorrect), costing significant time and effort to fix. The *Archimedes Palimpsest* data set demonstrates an error of this type. The fourteen pages that make up the Aristotle commentary in the palimpsest are assigned undertext foliation with the code 'Alex' as a shorthand for Alexander of Aphrodisias, who was originally thought to be the author of the text:

143r-146v_Alex01r_Sinar_LED365_01_pack8.tif

This attribution is now disputed, and the project scholars prefer Porphyry as the likely author, making the filenames in the data set problematic at best.[13] Furthermore, human participation in the creation and management of meaningful file names and the temptation to manipulate, correct or 'improve' file names containing content information between the time of image capture and final publication can result in errors and inconsistencies that break the chain of information relied upon by automated workflows.

For the Sinai Palimpsests Project, the decision was made to base filenames on arbitrary numerical identifiers generated by the KatIkon application. These values were based on workflow units tied to an image's Shoot List and Shot Sequence, concepts developed to organize workflow and manage the relationship between images and manuscript and folio metadata (see Fig. 1). A 'Shoot List' is defined as a container for a number of Shot

[12] Early in the Sinai Palimpsests Project 31 capture exposures were made for each Shot Sequence.
[13] Chiaradonna *et al*., A Rediscovered Categories Commentary.

Sequences for a given manuscript and a given capture configuration. A 'Shot Sequence' is a named entity representing the subject of a single sequence of spectral images and typically corresponds to one folio side; however, in some instances a Shot Sequence can be assigned more than one folio side if needed. A Shot Sequence Number, or 'cube name', is composed of a Shoot List number and a Shot Sequence serial number; for example, Shoot List number *3* would have Shot Sequences 0003_000001, 0003_000002, 0003_000003, and so on. The cube name serves as the basis for the filename. For example, 0030_000076+MB625Rd_007_F.tif is an image from Shot Sequence 0030_000076 (in shorthand, 30-76), illuminated with 625 nm LEDs from the two main light panels (MB625Rd), the seventh in the series of shots in this sequence (007), and is a flattened (F) image in TIFF (.tif) format. Metadata stored in the folder with the images from this Shot Sequence informs us that the folder contains images of Sin. geo. NF 61, f. 38v. Note that each image is connected to a manuscript and one or more folios via its Shot Sequence.

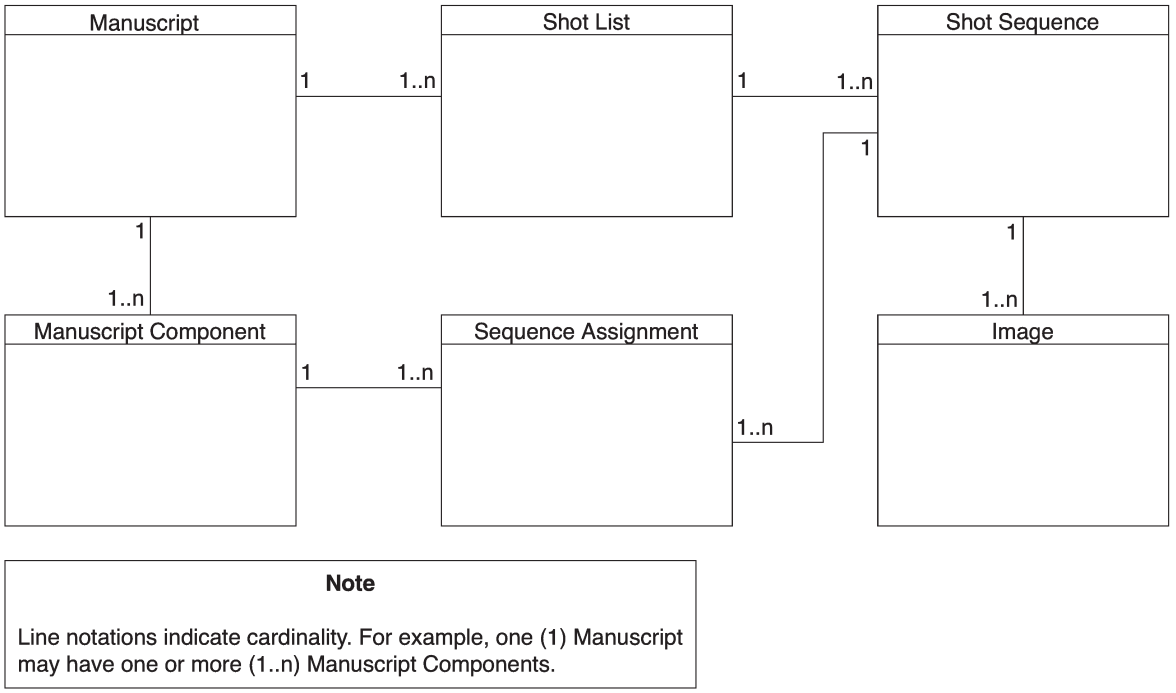

Fig. 1: KatIkon Shoot List and Shot Sequence

The use of the Shoot List and Shot Sequence has several benefits:

1. A Shoot List and all its child Shot Sequences belong to a single manuscript. Any number of Shoot Lists can be created for a manuscript. Thus, the Shoot List makes possible the creation of different groups of images for one manuscript.
2. Any number of folio sides from a single manuscript can be assigned to a Shoot List. Thus, the imaging of a manuscript's folio sides can be handled as discrete units of work. For example, a user can create separate Shoot Lists for folio sides to be shot on a book cradle and those to be shot on a copy stand.
3. Because each Shoot List will have its own identifying number, its Shot Sequences will have unique Shot Sequence Numbers and the files created with those numbers will have unique names. Thus, users can create multiple Shoot Lists for the same folio sides of a manuscript without risk of filename collision. This method was used by the Sinai Palimpsests Project to photograph the same manuscript using different capture configurations and retain both sets of images without ad hoc adjustment to file identifiers.
4. The use of the Shot Sequence number in the file name separates the file identifiers from image content information. If a Shot Sequence is assigned to the wrong folio sides, the error can be corrected in the metadata without requiring the renaming of files, files that may exist in several distributed copies.

5. Finally, the Shoot List-Shot Sequence model integrates a flexible workflow with the management and integration of images and metadata, both technical metadata and the descriptive metadata collected for the manuscript, its folio sides, and their undertext layers.

There are disadvantages to the use of Shot Sequence numbers as proxies for content information. The flexibility provided by filenames without content information comes at the cost of being able to quickly identify the subject of an image on the basis of the filename. The use of opaque filenames creates a need for tools and software to maintain the relationship between file and content metadata and to make content information discoverable by users. Image processors and other pre-publication users of the images had to rely on spreadsheets or other mappings to translate Shot Sequence numbers to shelfmarks and folio numbers. Further, these arbitrary names may be unsuitable for publication and archiving, thus placing an extra burden on the software that prepares and packages data for end user consumption. To send images to project scholars and prepare packages for delivery, Dr. Susan Marshall, the project's Data Operations Manager, used scripts that rewrite the filenames, adding shelfmark and folio information to their opaque working identifiers.

Nevertheless, the advantages of the Shot Sequence-based filename outweigh the disadvantages. One problem with content-based filenames is the need to handle unanticipated exceptional cases. Manuscripts often have duplicate folio numbers, accidentally skipped and unnumbered folios, or multiple, competing foliations. There may be the need to image the same folio side multiple times; for example, when a folio side has a fold-out that is imaged folded and unfolded. A folio side may be shot together with an opposing stub leaf bearing undertext writing. When unexpected complexities arise, reliance on content-based filenames creates the need to improvise ways of differentiating image content, often leading to inconsistent, cryptic, or cluttered filenames. Managing image labels, in metadata itself rather than in file identifiers, properly separates the roles of filenames and metadata. Moreover, as noted above, use of opaque filenames prevents their being incorrect or at variance with changing terminology or knowledge about the content of the image. The concepts of Shoot List and Shot Sequence provide a comprehensible and economical method for managing work and facilitating data integrity.

Similarly, KatIkon's model for managing scholarly text identification takes into account the necessities of work process and conceptual clarity. The approach taken has been documented elsewhere, but a brief summary here is useful.[14] Several manuscripts had undertexts in more than one language. Scholars working on the Sinai Palimpsests Project were sent images of those folio sides from a manuscript with undertexts suited to their expertise. The concept of 'Text Layer Grouping' was used to organize a set of images of a manuscript's folios with Folio Undertext Layers in a particular language and script. From a Text Layer Grouping, KatIkon generated an exportable list of folio images as input for a script that assembled data for delivery to each scholar. The scholar would identify the content of Folio Undertext Layers and assign them to Undertext Objects. An 'Undertext Object' is defined as all Folio Undertext Layers in a single extant manuscript that likely belonged to same notional past manuscript; that is, those of the same text and in the same hand. When archival packages were generated for fully documented manuscripts—those deemed editorially complete—the Undertext Object and associated Folio Undertext Layers were used to create TEI manuscript descriptions of the notional manuscript linked to the appropriate images. Again, human processes and the requirements of the project were mapped onto the data model. Note, too, that the model employed is integrated with the handling of files associated with Shot Sequences (see Fig. 2). Thus, through the Shot Sequences linked to a Manuscript Component (i.e., folio side), an Undertext Object and its Folio Undertext Layers are linked to the correct images.

[14] Emery and Rapp, KatIkon: A Digital Catalogue as Multi-Purpose Tools.

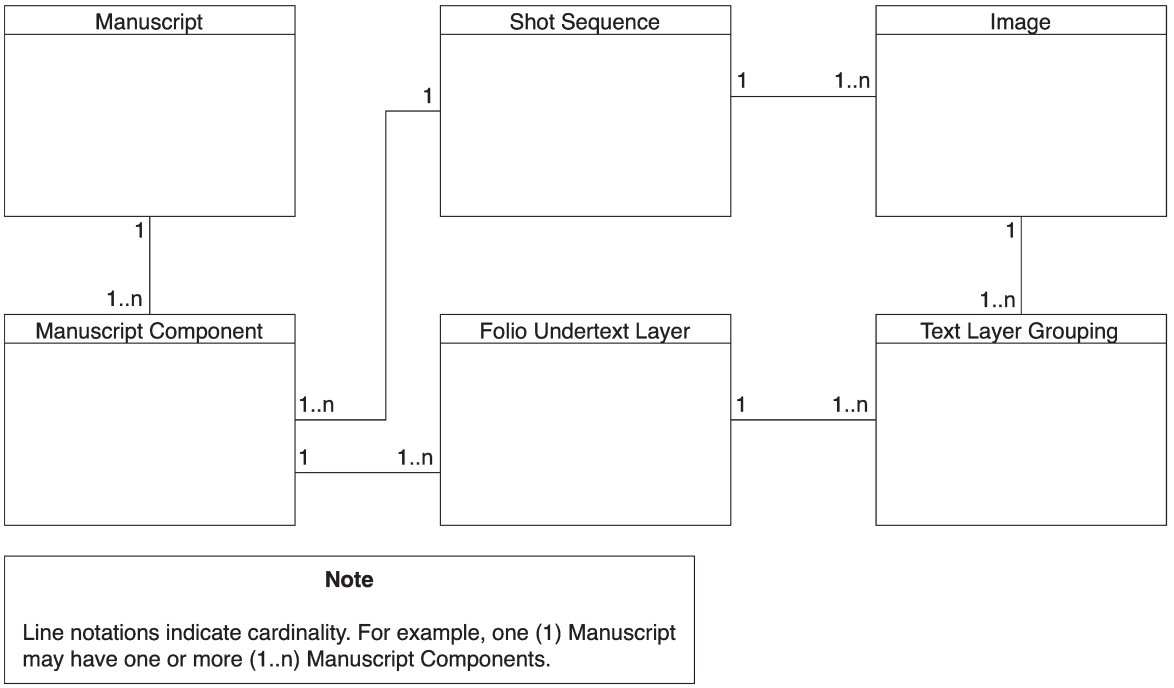

Fig. 2: KatIkon Undertext Identification model

CONCLUSION

This discussion is not intended merely as an argument for the virtue of one type of filename or data model. Rather it is intended to demonstrate the interrelationship between data modelling, work processes, and the management of data and metadata. The activity of cultural heritage digitization projects, particularly those that employ spectral imaging, involves many workflows and participants—curators, conservators, camera operators, image processors, scholars, digital archivists, and website developers. With large projects, the need for well-thought-out processes increases. The Sinai Palimpsests Project imaged palimpsest leaves from 74 manuscripts, and created a total of 6,944 sequences of images, 221,219 capture images, 217,834 processed images, all comprised in a data set of 50 TB. Imaging took place during several capture sessions spread over the period of the project. The image sets from each session travelled on hard drives from the Sinai to California, where they were logged and stored on the project's storage array by Susan Marshall, who then sent them to the four imaging scientists in New York, Maryland, and Hawaii. The scientists sent derived processed images back to Susan Marshall who logged and stored them. These processed images were packaged for delivery to scholars in Europe and the United States who did the work of identifying the palimpsest undertexts. Once all text identifications and codicological descriptions for a manuscript were complete, Susan Marshall generated an archival package of images, technical metadata, manuscript descriptions, and text identifications for delivery to the University of California at Los Angeles, for long-term preservation and publication on the project's research website. The scope and the operational complexity of the Sinai Palimpsests Project necessitated a robust, quality-focused process.

The processes designed for managing data, technical metadata, and cataloguing information for the Sinai Palimpsests Project are by no means the only approach that could have been taken. The tools created for the Sinai Palimpsests Project served a large and complex work process. The data model itself is a reflection of the objects and activities of the larger process. According to Matthew West, a data model 'defines the structure and meaning of data'.[15] Data models often define classes of objects that correspond to things in the real world, like 'manuscript'. These classes have attributes corresponding to their real-world counterparts, like 'shelfmark', 'title', 'language',

[15] West and Fowler, *Developing High Quality Data Models*.

'number of folios', and so forth. Often one class will have related classes. For example, a manuscript class can have many related objects of the class 'folio side'. The KatIkon model represents manuscripts, folios, and images, but also the activities of digitization and text characterization, as with the Shoot List and Text Layer Grouping.

Any work process, even one without a formalized model, has an underlying implicit data model. Designers of work processes, especially for large, distributed, or long-running projects that rely on data consistency and integrity over time, are well advised to be explicit about work products and activities, to think with rigour about the interrelationship between data and work activities. The concepts of the Shoot List and, especially, the Shot Sequence, recognize a critical fact of a spectral imaging project: the primacy of the *image cube*, the registered exposures of photographic subject captured in a sequential series, tied to a specific imaging system configuration. Previous imaging projects the author worked on implicitly treated multiple sets of images of the same folio side or sides as different versions of the same thing, using designations like '01', '02', '03' or 'A', 'B', 'C', 'D'. This is incorrect. However it is named, the sequence of exposures, called in the Sinai Palimpsests Project the Shot Sequence, is the unit of work, the unit of data, the unit of each folder of images. The use of the Shot Sequence concept, its concretization in the data model, workflow, and filenames adds clarity for project participants and consumers of the data alike, and reduces data conflicts and errors. It is one of a small number of developments in thinking and practice over the ten years of his work on spectral imaging projects that the author feels he got right.

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Dispersed Palimpsest Offers Digital Insight into St. Catherine's Library

INTRODUCTION

On 26 February 2013, Grigory Kessel visited the library of the owner of the Syriac Galen and Archimedes Palimpsests in the United States with Michael B. Toth. As Kessel sat at a large table in the centre of the private library, he held the bound Syriac Galen Palimpsest for the first time. After quietly handling the manuscript and inspecting the parchment leaves that showed traces of erased text in Syriac, he pulled up on his laptop screen an image of a Syriac manuscript folio with faintly visible undertext he had seen the week before in Harvard University's Houghton Research Library in Boston. He soon noted that the single folio MS Syriac 172 at the Houghton Research Library had the same overtext and the undertext also contained Syriac translations of the Galen text, most likely from the same original source of the erased undertext. This began what became known as 'The Hunt for the Missing Leaves'. Following up on initial multispectral imaging of the unbound Syriac Galen Palimpsest in 2009 and 2010, this launched a loose-knit technical and scholarly program by independent scholars, managers, scientific institutions, and universities for the multispectral imaging of all the folios that had originally been part of the same codex to make them available with free access for further study.

MULTISPECTRAL IMAGING AND DIGITAL REUNIFICATION

Under the leadership of the Walters Art Museum and R.B. Toth Associates, from 2009 to 2010 a multidisciplinary team conducted multispectral imaging of the Syriac Galen Palimpsest (SGP). This manuscript, disbound for the purpose, contains Galen's influential text *On the Mixtures and Powers of Simple Drugs*, which was translated from the original Greek into Syriac during the 6th century. The multispectral imaging project built on advances during the decade-long pioneering project to reveal the scrubbed-off text in the Archimedes Palimpsest.[1] This SGP Multispectral Imaging Project capitalized on more mature imaging and data management technologies and processes developed during and since the Archimedes Palimpsest Project, with the support and funding of the owner of both manuscripts. Following completion of imaging and digital image processing, the SGP Project hosted 300 GB of captured and processed SGP image data online for free, global access under a Creative Commons licence to advance the owner's goals of free access and data preservation.[2] In July 2010, all 231 folios of the Syriac Galen Palimpsest codex were hosted on http://digitalgalen.net/ by the University of Pennsylvania Libraries. In the meantime, the digital data continued to serve scholars developing new understanding of the transmission of Greek Medicine in manuscripts of different language traditions.[3] Following this imaging, the Syriac Galen Palimpsest was rebound by conservators and returned to the owner's library—but not for the last time.

The open access availability of all the SGP images from the 2009–2010 project permitted continued remote research by various scholars of Syriac, ancient medicine, and the transmission of Western knowledge, including Grigory Kessel. Several years after completion of the SGP Multispectral Imaging Project, Grigory Kessel and Michael B. Toth visited the SGP owner's private library in 2013 for a hands-on review of the actual palimpsest codex. Kessel realized that a folio he had examined at the Harvard University's Houghton Library matched the form and content of folio 223 of the bound Syriac Galen Palimpsest in the owner's private library (Fig. 1). This led Kessel to review Sebastian Brock's catalogue of Syriac manuscripts in St. Catherine's Mon-

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1 Noel, Introduction.

2 Noel, Revealing Lost Codex of Archimedes.

3 Bhayro and Brock, Syriac Galen Palimpsest and Transmission.

astery in the Sinai.[4] Kessel noted that one entry cited a medical undertext that appeared to be a folio from the Syriac Galen Palimpsest. After multispectral imaging of both the Harvard and Sinai folios, a continued catalogue search by Kessel led to the discovery of three more SGP folios in the Biblioteca Apostolica Vaticana (BAV)[5] and one in the Bibliothèque nationale de France (BnF).[6] With support from the owner, the six additional folios that belonged to the SGP discovered by Grigory Kessel were imaged with multispectral imaging systems in the following institutions:

Houghton Library	Syriac 172
St. Catherine's Monastery Library	Syr. NF Fragment 65
Biblioteca Apostolica Vaticana	sir. 647, ff. 38 and 39; sir. 623, f. 227
Bibliothèque nationale de France	syr. 382

In addition to the captured sequences of multispectral images and digitally-processed images, standard metadata was captured for each folio, based on the Archimedes Palimpsest Metadata Standard. The Holy Monastery of St. Catherine in the Sinai, the Biblioteca Apostolica Vaticana, the Bibliothèque nationale de France (Fig. 2), and Harvard University Houghton Library provided not only access to their manuscripts for multispectral imaging, but also, along with the anonymous owner of the codex, generously granted Creative Commons licences to share the captured and processed digital data online for free access on www.digitalgalen.net (Fig. 3).[7] Thus, in September 2016, with the addition of all the digital images from the newly-identified folios at St. Catherine's Monastery, the Bibliothèque nationale de France, the Biblioteca Apostolica Vaticana, and the Houghton Library at Harvard, the Syriac Galen Palimpsest was digitally reunited for the first time since the folios had been dispersed in the 19th century from St. Catherine's Monastery in the Sinai Desert.[8]

INDEPENDENT SCHOLARLY RESEARCH PROGRAM

A number of other scholars had capitalized on the open access to the SGP data for independent research into the Syriac Galen Palimpsest, beginning in 2012. This included two collaborative teams with Siam Bhayro, Grigory Kessel, Robert Hawley, Peter Pormann, and others.[9] The multispectral images hosted online enabled the researchers from the Universities of Manchester and Exeter to identify more undertext in the Syriac Galen Palimpsest and to reconstruct the structure of the original manuscript. At the same time, scholars in Paris used the images in their research into the use of herbals in ancient medicine, and hosted a 2013 conference that included discussions of the recently-reunited palimpsest.[10] One outcome of their research into ancient medicine was the realization that 'the Syriac text of … the SGP can be of considerable importance not only for Syriac studies, but also and even especially for specialists of Greek medical texts, since it sometimes allows one to propose or corroborate corrections to the Greek text of Galen's treatise *On Simple Drugs*'.[11]

Building on this research that scholars had until then undertaken independently and in loose communication with each other, in 2015 an international team received a grant from the Arts and Humanities Research Council of Great Britain for the Syriac Galen Palimpsest Project. Their goal was to identify the Galen undertext in the SGP and enhance its readability with advanced digital processing so they could produce a scholarly edition of the now digitally-reunified original Syriac Galen Palimpsest.[12] After significant progress in the development of advanced computational methods and their use for additional digital processing of the existing images, the team realized the laws of physics prevented them from gleaning any more information from the images that had been produced in 2009 and 2010 with earlier multispectral imaging systems. This included three bifolios that had remained completely illegible after the previous multispectral imaging: the recto and verso sides of

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4 Brock, *Catalogue of Syriac Fragments (New Finds)*, 63–64, 265–266.
5 Rilliet, Nouveaux fragments syriaques à la Bibliothèque Vaticane.
6 Briquel-Chatonnet, *Manuscrits syriaques de la Bibliothèque nationale de France*, 81–83.
7 University of Pennsylvania Libraries, *Openn, The Galen Syriac Palimpsest*.
8 Kessel, Membra disjecta sinaitica I.
9 Bhayro *et al.*, Collaborative Research on the Digital Syriac Galen Palimpsest.
10 The conference, 'From Babylon to Baghdad: Toward a History of the "Herbal" in the Near East', was hosted by the Institut catholique de Paris from 12th–14th November 2013, as part of the ERC project FLORIENTAL.
11 Calà *et. al.*, Textual Interest of Syriac Versions.
12 University of Manchester, *Recovery of Lost Text*.

bifolios 31+38, 143+146, and 191+194. A collaborative team from R.B. Toth Associates LLC, Equipoise Imaging LLC, Stanford University Library, and the Stanford Synchrotron Radiation Lightsource (SSRL) at the US Department of Energy's SLAC National Accelerator Laboratory developed a dynamic advanced imaging program to try to reveal more of the thoroughly-erased Galen undertext in the SGP manuscript.

ADVANCED IMAGING PROGRAM

In 2015, initial multispectral imaging with the latest generation system of key folios of the rebound manuscript in the owner's library provided the scholars with additional information. This helped them characterize both the bound codex and the dispersed folios with increased visibility of more undertext and understanding of the treatment of the parchment that made the undertext so difficult to read. It also demonstrated the potential offered by a larger-format Phase One achromatic camera, additional filtering of fluorescent images, new Equipoise LLC illumination panels, and longer exposures—all significant advances from the 2008 and 2009 imaging sessions.

In conjunction with this multispectral imaging test, the team also developed plans to conduct x-ray fluorescence (XRF) imaging of the Syriac Galen Palimpsest at SLAC SSRL, capitalizing on additional power and new higher-speed scanning techniques implemented since the initial XRF scanning of the Archimedes Palimpsest. Uwe Bergmann and Michael B. Toth conducted elemental XRF analysis in the owner's library of key regions of interest in the Syriac Galen Palimpsest, to determine the feasibility of and technical parameters for XRF imaging. They found the Syriac Galen Palimpsest posed a significant challenge for XRF imaging—especially compared to the Archimedes Palimpsest—since it had a significant calcium response and very low iron response in regions of undertext. Their initial XRF analysis revealed the ink in the religious overtext and the residual ink from the scrubbed-off undertext responded differently in XRF, with a very low fluorescence response from the undertext. This would make XRF and follow-on multispectral imaging much more difficult than it had been for the Archimedes Palimpsest.

The SSRL XRF scientific experimental proposal was prioritized for x-ray synchrotron beamtime after it had been scientifically peer reviewed and rated by the SSRL Proposal Review Panel. The team had, however, to address one major problem: the codex had been rebound since the prior multispectral imaging. This would prevent imaging of the gutter regions and XRF imaging by mounting bifolios in an apparatus that would accurately move each one back and forth in front of a 100-micron x-ray beam. The owner agreed to have the SGP codex disbound yet again.

The scholarly team led by Peter Pormann, including Natalia Smelova, Naima Afif, William Sellers, Grigory Kessel, and Siam Bhayro, developed a prioritized list of folios and regions of interest for further imaging to reveal needed undertext that could help them to identify and read additional lines of Galen text. The scholars provided an initial list of twenty of the highest-priority folios that were critical to their understanding of the Syriac Galen Palimpsest and its text across this and the other relevant manuscripts, based on their inability to discern information from the previous multispectral images.[13] This list was updated throughout the imaging based on their near real-time review of images:

Reconstructed original bifolio	*Readability*	*Book*	*Sides*
31r+38v	unidentified	??	1
31v+38r	unidentified	??	2
143r+146v	unidentified	??	3
143v+146r	unidentified	??	4
191r+194v	unidentified	??	5
191v+194r	unidentified	??	6
33v+36r	unreadable	IX	7
72r+75v col. A	unreadable	VII	8

[13] Natalia Smelova, *pers. comm.*, 13 February 2018.

Reconstructed original bifolio	*Readability*	*Book*	*Sides*
80r+83v col. B	unreadable	V	9
94r+99v	unreadable	V	10
101r+108v	unreadable	VII	11
167v+170r	unreadable	II	12
173r+180v	unreadable	VIII	13
176v+177r	unreadable	VI	14
198r+203v	unreadable	VII	15
208v+209r	unreadable	VII	16
215v+220r	unreadable	VIII	17
222v	unreadable	III	18
223r+226v	poor/unreadable	IV	19
223v+226r	poor/unreadable	IV	20

While the multispectral imaging systems were brought to the dispersed palimpsest folios for onsite imaging—whether they were in a private library in the United States, libraries in Boston or Paris, or even in Vatican City and the middle of the Sinai Desert—for XRF imaging the SGP had to be transported to the multi-billion dollar, 240 metre in circumference, high energy storage ring and x-ray source in California. The still-bound Syriac Galen Palimpsest was couriered to the Stanford University Library Conservation Department in California in early 2018. There the trained Library Preservation Team carefully removed all the bifolios from the binding and prepared custom flat mounts to position the folios for precise imaging. This was only possible with the prior documentation, preservation, and rebinding by the professional conservation team led by Abigail Quandt at the Walters Art Museum.

ADVANCED MULTISPECTRAL IMAGING

Multispectral imaging of the Syriac Galen Palimpsest in the Stanford University Library Conservation Department took place in March 2018 with a 100 Megapixel (MP) Phase One camera and portable system brought out to Stanford by Toth. The following bifolios of the Syriac Galen Palimpsest were imaged in the Stanford University Library Conservation Lab with the latest multispectral imaging system: 31r+38v, 31v+38r, 33r+36v, 33v+36r, 80r+83v, 80v+83r, 125r+132v, 125v+132r, 143r+146v, 143v+146r, 152r+153v, 152v+153r, 191r+194v, and 191v+194r. These images were added to the Research Contributions folder (https://digitalgalen.net/ResearchContrib/) of the digitalgalen.net website by the University of Pennsylvania Libraries.

The narrowband multispectral imaging system used during this program included commercial off-the-shelf hardware and software for digital multispectral image capture and viewing as part of the integrated system. This latest system (Fig. 4) offered greater dynamic range, more illumination wavelengths, and higher resolution than the system used in St. Catherine's Monastery Library and the prior imaging at the Walters Art Museum. It also included customized image processing software for processing and exploitation of the spectral images by the users. The Phase One 100 MP medium-format camera with a 11608 × 8708 pixel sensor took a series of high-quality digital images, each illuminated by a specific wavelength of light. The resulting image set was then digitally processed and combined to reveal residues and features in the object that are not visible to the eye in natural light. These processed images (generated from the captured images) served to clarify the Galen undertext in the SGP, providing more information for scholarly research.

Camera System

One of the challenges with the application of the latest technical systems for long-term studies is the dynamic nature of technology development, requiring the integration of rapid advances in sensors, digital processing, and data handling to get the best results for researchers.[14] The camera system utilized for the follow-on multispectral imaging of the Syriac Galen Palimpsest incorporated the latest in digital sensor technology, offering the higher signal-to-noise ratio needed to capture very faint fluorescence from the parchment. The Phase One XF Camera System with a 100 MP Achromatic CMOS sensor and a 120 mm macro lens produced images of over 1200 pixels per inch. The higher sensitivity of the sensor with passive thermal management also allowed shorter exposures at higher ISOs—capturing in a single day what used to take several days of imaging with earlier systems. Automatic focusing greatly aided setup and minimized handling of the fragile palimpsest folios.[15]

Illumination System

The imaging system provided narrowband illumination with light in specific wavelengths from the low heat and low maintenance, long-lifetime light emitting diodes (LEDs). It included two new integrated Equipoise Imaging illuminators, each with multiple LEDs, providing illumination for imaging in distinct ultraviolet, visible, and infrared wavelengths. This was integrated with the operating software to allow simplified system operation and unified metadata capture. Ten illumination types were used to produce each image:

- 370 nm ultraviolet (UV) LED illumination
- 448 nm visible LED illumination
- 476 nm visible LED illumination
- 499 nm visible LED illumination
- 519 nm visible LED illumination
- 598 nm visible LED illumination
- 636 nm visible LED illumination
- 780 nm LED infrared (IR) illumination
- 870 nm LED IR illumination
- 940 nm LED IR illumination.

Filter System

To capture fluorescence from an object, a six-position motorized filter wheel containing two-inch square optical glass filters, with control software and a computer interface, inserted a filter into the optical path during additional images captured at short wavelength illuminations. Filtered images increase the range of captured information to include fluorescence emissions. This allows the characteristic spectra of substrates, colourants, and contaminants to be revealed from the faint light they emit. The filter wheel is driven by computer control with a removable carousel containing a selection of filters (UV bandpass; visible bandpass and longpass filters). The following filters were used in follow-on multispectral imaging of the Syriac Galen Palimpsest:

- N = CLEAR (no filter)
- U = BP365 (UV bandpass filter)
- V = LP400 (long pass filter that passes wavelengths longer than 400 nm – blue and above)
- G = LP515 (long pass filter that passes wavelengths longer than 515 nm – green and above)
- R = LP590 (long pass filter that passes wavelengths longer than 590 nm – red and above)
- I = LP715 (long pass filter that passes wavelengths longer than 715 nm – IR and above)

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[14] Christens-Barry *et al.*, Camera System for Multispectral Imaging, vol. 724908.
[15] Phase One A/S, *XF IQ3 100MP Camera.*

Image Capture Integration

Another challenge in efficient multispectral imaging of manuscripts is the ability to integrate all imaging functions into a single automated process. To accomplish this, the Spectral XV image capture operating software provided integrated control of the digital camera back, filters, and illumination as a single system. This mature software—developed by Equipoise Imaging LLC based on the CaptureCore application engine used by Phase One A/S to control camera capture operations and processing workflow—allowed streamlined operation and metadata capture from a single interface with simple and efficient setup and imaging.

Spectral Image Processing

The efficiency of multispectral imaging is dependent on the speed not only of image capture, but also image processing by the end users. Captured images are processed with image processing software in the customized Paleo Toolbox—a spectral imaging toolkit created by Equipoise Imaging, LLC, for applications in cultural heritage imaging. The Paleo toolkit comprises plugin modules that integrate into ImageJ, an open source image processing tool originally developed at the US National Institutes of Health. ImageJ has been widely adopted and extended by scientists working in remote sensing, biological science, and cultural heritage world-wide. It offers a wide range of digital operations for the enhancement and reproduction of non-visible features from the objects based on their spectral response in images captured with the full set of illumination wavelengths and emission bands. The Paleo Toolbox allows researchers to capitalize on these powerful tools with just a few clicks of a mouse.

X-Ray Fluorescence Imaging

High-powered x-rays easily penetrate the collagen of parchment, but energize metallic inks and other elements heavier than aluminum on the surface to emit fluorescence radiation. The strength of this fluorescence radiation is recorded with sensitive detectors. By moving the manuscript folio back and forth in microscopically small steps in a very fine x-ray beam about the width of a human hair, raster scanning the palimpsest folio can yield elemental XRF maps that reveal text that is not visible with optical imaging. This was used to reveal undertext and text that had been painted over with forged illuminations in key leaves of the Archimedes Palimpsest. The US Department of Energy-funded SSRL SPEAR3 3-GeV, high-brightness third-generation storage ring was upgraded in 2004, after the Archimedes Palimpsest XRF imaging.[16] These extremely bright x-rays were used to image the Syriac Galen Palimpsest in 2018 and 2019. For Syriac Galen Palimpsest imaging, it operated at 500 mA in top-off mode with energy added every five minutes, so that the imaging did not have to stop every eight hours to top-off the beam with more energy—as occurred during Archimedes Palimpsest imaging. The upgraded XRF imaging systems developed by SLAC SSRL produced five megapixel elemental maps in a half to a third of the time it took to scan the Archimedes Palimpsest, and with high reliability and low emittance. Based on the strength of the XRF imaging proposal and peer review feedback, SLAC SSRL made two beam lines available for the initial imaging session at Stanford in 2018: Beamlines 6–2 and 10–2, both of which were equipped with climate control systems to regulate temperature and humidity for the parchment.

XRF imaging was conducted around the clock since beamtime is always in high-demand from more than 1,600 scientists from around the world who conduct experiments at SSRL. Each designated bifolio was mounted on a translation stage that moved it in front of the beam for scanning, and the lead-lined hutch was locked before the x-ray beam was opened (Fig. 5). After the scan was completed eight to 12 hours later, the bifolio would be swapped out for another and the next scan would begin.[17] The scanning hardware and software at SSRL only allowed scanning in one direction, but a future bidirectional upgrade should minimize overhead time required to return the manuscript to the beginning of the next scan line.

Each page was scanned and the resulting elemental maps captured using SLAC SSRL operating systems were converted from Hierarchical Data Format (HDF) hdf5 data to 16-bit.TIF format and jpegs. HDF is a data model and file format designed by the National Center for Supercomputing Applications for the storage and

[16] SLAC National Accelerator Laboratory, *Stanford Synchrotron Radiation Lightsource*.
[17] Bartels, Greek Medical Text Rediscovered.

manipulation of scientific data across diverse operating systems and machines.[18] The resulting TIFF and jpeg image files for each element were posted online for study by the scholars on the project. Throughout the imaging process, scholars in the UK (some nine hours ahead of the California time zone) would review the images and offer immediate feedback via email and marked up jpeg images. As an example, during the January 2019 imaging session, the scholarly team noted good results, with a 31 January email from Peter Pormann stating: 'For fol. 141v–148r, we were able to read the complete rubric (which was totally invisible beforehand). It is particularly nice, as it contains the title to chapter 3.6 and has an interesting variant reading compared to the Greek …'[19]

Data Integration

Supporting not only the current team of independent scholars, but also future research, required good data management and standardization. Borrowing from the Archimedes Palimpsest Program, that program's metadata standards were followed for multispectral imaging, as well as the metadata extensions for XRF imaging. All the images and metadata now being hosted in simple flat files on the University of Pennsylvania Library's OPenn online data repository are accessible directly through digitalgalen.net.

All the SGP data and metadata was stored during the image collection process, including those from the original privately-owned codex, as well as the dispersed folios in other institutions. The multispectral image capture software collected the stacks of multispectral images in separate capture image folders. Each folder includes descriptive metadata in an associated JSON file with details of the image capture that are automatically entered by the Spectral XV software. This includes basic *Archimedes Palimpsest Metadata Standard* metadata.[20] For the SGP multispectral images these include:

Name:	SGP 100MegaPixel Phase One
Rights:	CC 4.0 BY
Publisher:	Owner of the Syriac Galen Palimpsest
ProjectNickName:	SGP100MP
Creator:	MB Toth
Contributors:	R.B. Toth Associates, Stanford University Libraries, Digital Transitions, Phase One A/S, SLAC SSRL
Description:	High Resolution Images of Syriac Galen Palimpsest
Location:	Stanford University Libraries

The XRF metadata was stored in imaging logs and imaging system files throughout the imaging sessions, and then entered into a single metadata document for each of the three imaging sessions in accordance with the *Archimedes Palimpsest Metadata Standards XRF Extensions*.[21] Since two beam lines were used for the 2018 imaging session, two sets of metadata were documented.

The following bifolios of the Syriac Galen Palimpsest were imaged at two beam lines at SLAC SSRL in the 2018 imaging session, with some bifolios also imaged with multispectral system at the Stanford University Library:

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[18] Oak Ridge National Laboratory, HDF5 Overview.
[19] Pormann, *pers. comm*., 31 January 2019.
[20] University of Pennsylvania Libraries, *Archimedes Palimpsest Metadata Standard*.
[21] University of Pennsylvania Libraries, *Metadata Standard XRF Extensions*, 2008.

Beam Line 6–2

31r+38v	31v+38r	Also 100 MP Multispectral Imaging
33r+36v	33v+36r	Also 100 MP Multispectral Imaging
80r+83v	80v+83r	Also 100 MP Multispectral Imaging
103r+106v	103v+106r	
125r+132v	125v+132r	Also 100 MP Multispectral Imaging
143r+146v	143v+146r	Also 100 MP Multispectral Imaging
152r+153v	152v+153r	Also 100 MP Multispectral Imaging
167r+170v	167v+170r	
176r+177v		
191r+194v	191v+194r	Also 100 MP Multispectral Imaging
216r+219v	216v+219r	

Beam Line 10–2

152r+153v	152v+153r	Also 100 MP Multispectral Imaging
80r+83v	80v+83r	Also 100 MP Multispectral Imaging
190v+195r	190r+195v	
94r+99v		
23r+30v	23v+30r	
199r+202v	199v+202r	
101r+108v		
125r+132v	125v+132r	Also 100 MP Multispectral Imaging

While the x-ray beam penetrated the parchment of the folios to yield an elemental response from both sides at the same time, each side of most folios was imaged to increase the XRF signal needed to reveal the very faint text.

The scholars usually reviewed the multispectral images first, and then turned to the XRF TIFF images created from the elemental maps to glean more details from the undertext. In most cases the scholars reviewed and compared the digital images from both the multispectral imaging and the XRF imaging separately, but for some images the scientists and technical personnel would overlay an XRF image on the multispectral image. Advancing this technique by automatically merging multispectral and XRF images may offer researchers a useful research tool. Correlating XRF elemental data with specific spectral responses in multispectral images may also offer an easier and portable method of deriving more information from objects that cannot be subjected to XRF scanning, potentially benefiting from artificial intelligence as well.

Given the difficulty in reading the Galen undertext, Dr. William Sellers at the University of Manchester developed an open-source, machine-learning artificial intelligence software tool called GalenQt that significantly increases the readability of the processed undertext images (Fig. 6). The open source program is freely available to enhance visualization of a variety of advanced technical image sets. This tool proved invaluable in detecting and enhancing undertext that could not be seen with statistical procedures and transformations only, such as Principal Component Analysis. This enabled the scholars to work through the various images to identify and read more of the Galen undertext in the SGP.

CONCLUSION

The Syriac Galen Palimpsest Program significantly advanced the methodology and standards for integrating image data from a palimpsested manuscript that had been dispersed from its original location: St. Catherine's Monastery in the Sinai. In the over a decade since the completion of the Archimedes Palimpsest Project, advancements in technology have offered new opportunities for advanced research into palimpsests. In addition to reuniting the original manuscript, the loose-knit and dynamic program advanced knowledge of the palimpsest and its origins and is making a large corpus of data available online. This program benefitted from the three key components of an effective system: 1) *People* who are knowledgeable, 2) *Processes* that are defined and repeatable, and 3) *Technology* that provides useful results in timely fashion.

This program relied on several key aspects of advanced digitization and access to support researchers around the globe as they attempted to get more information from the very difficult-to-read Galen undertext:

1. *Multispectral Imaging*: Advances in imaging technology provided more information of use to scholars that was not available from the initial imaging with earlier-generation systems. Integration of new advanced imaging systems hastened the imaging itself and provided scholars with the needed tools to reach conclusions based on images they could develop themselves. The off-the-shelf camera systems with higher resolution and new light panels with more LEDs in additional spectra of light provided new wavelengths of reflected light, as well as generated additional fluorescence—all in less time.
2. *XRF Imaging*: The XRF imaging revealed text not visible with enough detail in any multispectral imaging. SSRL advances provided a steadier and brighter x-ray beam that greatly eased the setup and imaging of manuscript leaves. The advanced XRF analysis and multispectral imaging in the owner's library provided useful information to maximize the results from the limited beamtime available.
3. *Image Processing and Visualization*: Advanced processing proved critical to differentiating faint undertext from the background noise of the parchment. The integrated Paleo processing tools based on ImageJ provided scholars with the ability to develop images that met their specific needs, while the Galen QT machine-learning tool revealed text that statistical methods failed to show.
4. *Metadata Standards and Access*: The availability of image data for current and future generations of scholars is entirely dependent on the ability to identify not only the images of interest, but also the technical parameters associated with their collection and processing. The Archimedes Palimpsest Metadata Standards developed in the previous decade continued to clearly define the metadata elements required for efficient image access and further research.
5. *Interdisciplinary Development*: Advancing knowledge of the Syriac Galen Palimpsest required collaboration across the humanities and sciences in developing methodologies and technologies to better meet researchers' needs. This demonstrated that it is no longer sufficient to have scientists and scholars working together to just produce good images. Instead, they have to work more broadly on the development of technology and work processes that put useful tools directly into the hands of non-technical researchers.

Automatically merging multispectral and XRF images, building on the manual process used during this project, may offer researchers a useful research tool. Correlating XRF elemental data with specific spectral responses in multispectral images may also offer an easier and portable method of deriving more information from objects that cannot be subjected to XRF scanning, potentially benefiting from artificial intelligence as well.

Building on similar projects that came before, this program is providing new insights into this key manuscript of medical knowledge. While the parchment codex is no longer part of the Library of St. Catherine's Monastery, the codex and all its dispersed leaves are even more freely accessible for research now in digital form, with publication of a scholarly edition planned by 2022 by the University of Manchester, supported by the Arts and Humanities Research Council of Great Britain—if Covid health restrictions permit.

ACKNOWLEDGEMENTS

The successes of imaging programs such as the imaging of and research into the Syriac Galen Palimpsest rely on the expertise and dedication of international teams of professionals. Each of them contributed to this project with their own unique skills: scholars, conservators, interns, scientists, engineers, librarians, curators, data administrators and managers, and many others. All their dedicated work provides valuable data and information for future generations. Of particular note is Grigory Kessel's tenacious hunt for missing leaves of the Syriac Galen Palimpsest. His research enabled the imaging and digital reunification of what is believed to be the entirety of the original erased text.

This program was dependent on the generosity of the owner of the Syriac Galen Palimpsest as he gave permission to disbind his Syriac Galen Palimpsest and image it yet again. Not only has his support allowed significant technical development for other projects, but his focus on efficiencies and scope throughout the project has also advanced cultural heritage digital projects and open data access.

Ultimately it fell to Doug Emery and the team at the University of Pennsylvania Schoenberg Institute of Manuscript Studies to corral all the data and make it available online for free access.

Further acknowledgements: Special thanks to Doug Emery for presenting this paper at the Vienna Palimpsest Conference in April 2018, as well as Peter Pormann, Bill Sellers, Bill Christens-Barry, Uwe Bergmann, and Grigory Kessel for information that proved critical to this paper. The author also appreciated the ideas and support of the late Robert B. Toth, founder of R.B. Toth Associates.

Fig. 1: Grigory Kessel studying the SGP (© R.B. Toth Associates)

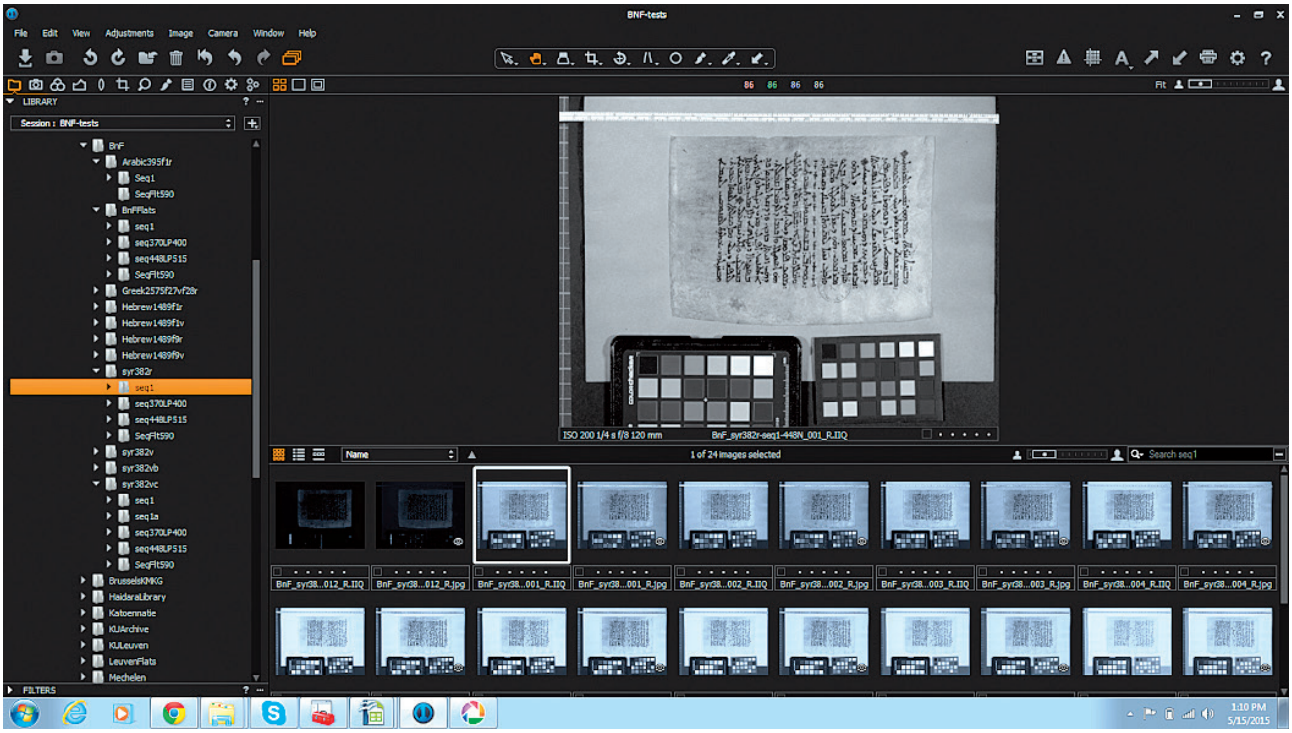

Fig. 2: (B&W) SGP Multispectral image stack captured at BnF (© R.B. Toth Associates & Phase One A/S)

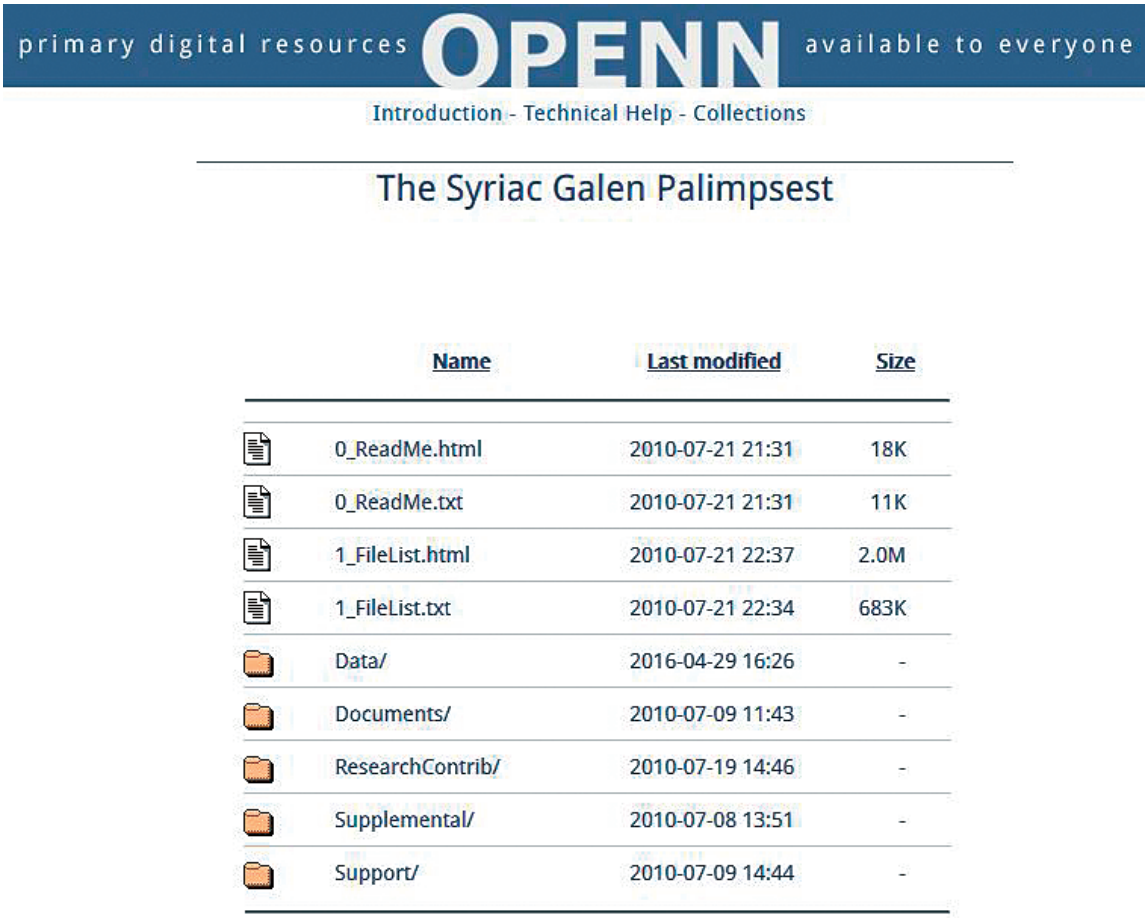

Fig. 3: (B&W) Digitalgalen.net site on University of Pennsylvania Libraries OPenn (© University of Pennsylvania Libraries)

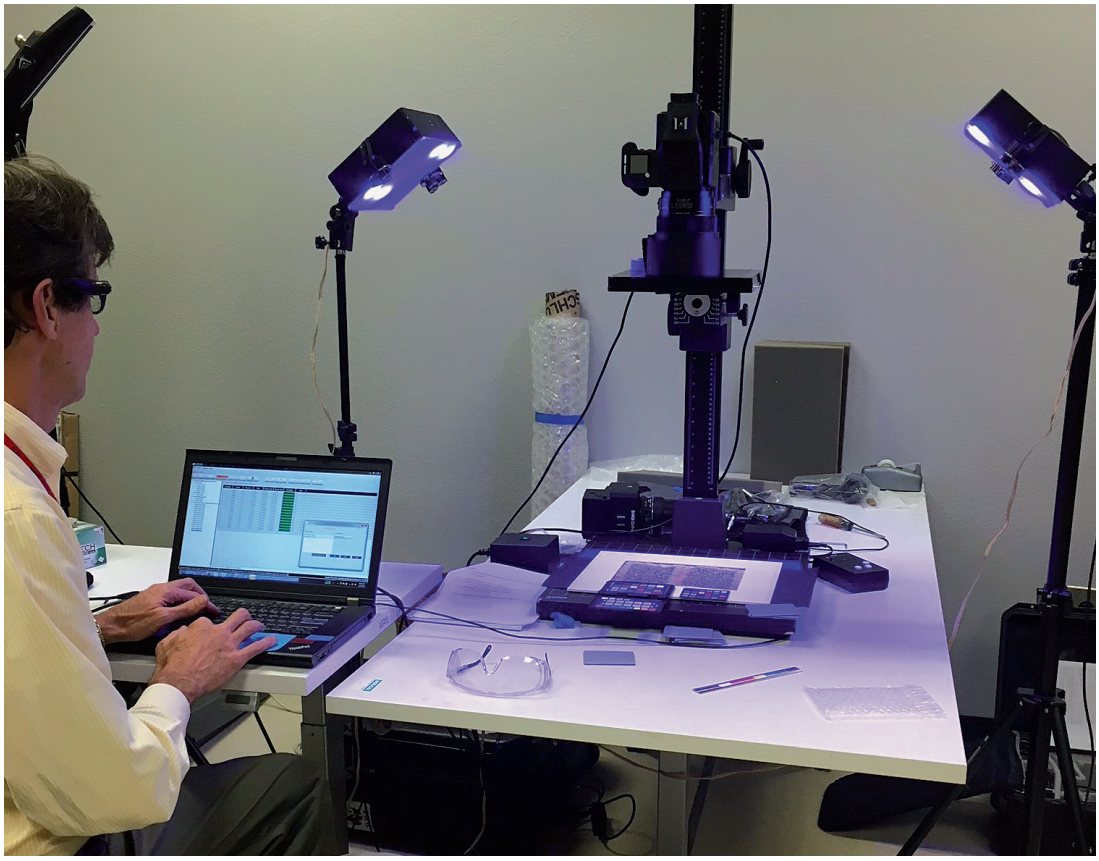

Fig. 4: Multispectral imaging the SGP at Stanford University Library (© R.B. Toth Associates)

Fig. 5: SGP bifolio mounted on translation stage in SLAC SSRL beamline hutch (© R.B. Toth Associates)

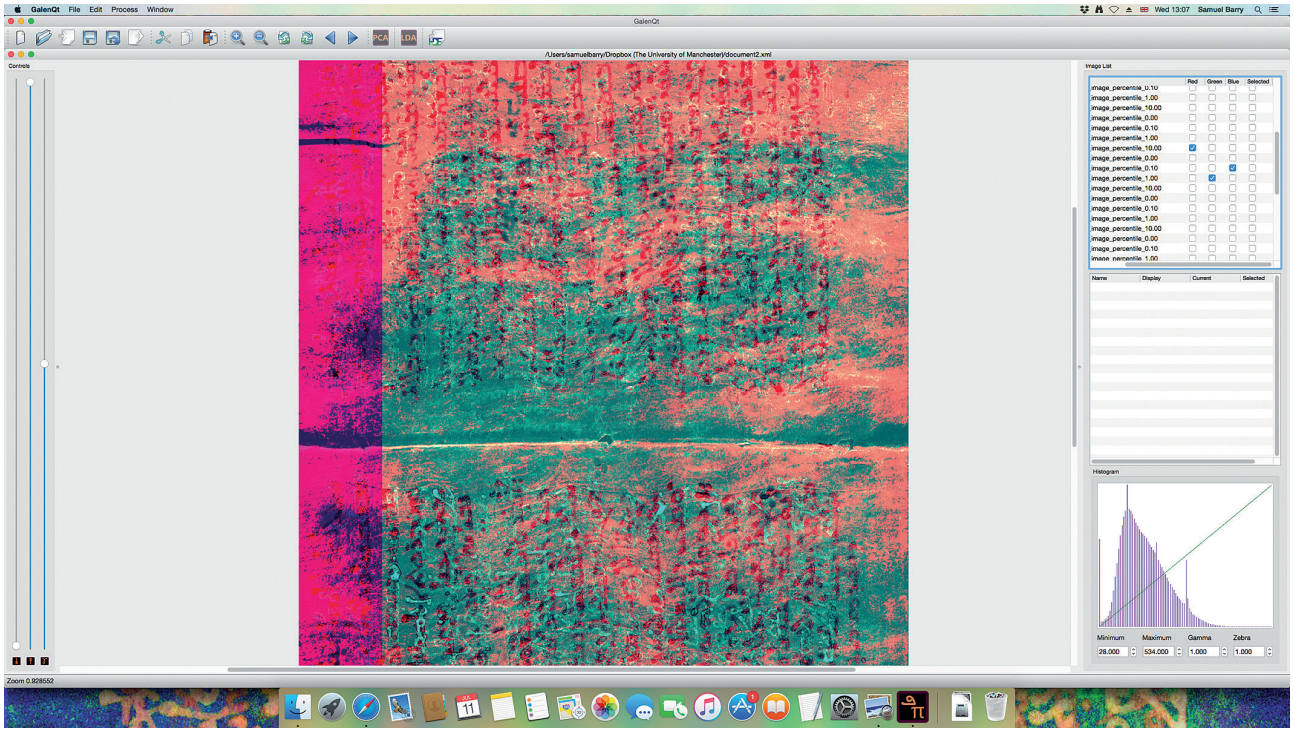

Fig. 6: (B&W) Galen QT software revealing elemental map of SGP undertext (© William Sellers)

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Gregory Heyworth

From Technology to Text: Reading and Editing the Lacunose Manuscript

... facilis descensus Averno
Aeneid, 6.125

Nature, as Aristotle famously suggested, abhors a vacuum.[1] Philologists feel much the same way about the lacuna—that absence, that hole in the text, that stain, that blot that obscures. For those for whom reading old texts means a great deal, and being able to read them accurately means even more, the lacuna declines easily from a figure of absence to one of anxious presence, from objectivity to subjectivity. While the dispassionate scientist in us may see an absence as a material defect, the humanist, who holds a professional stake in the text, discovers a personal failing. The letters on the edge of a lacuna taunt like an unfinished Sunday crossword on Monday morning. We possess the clues, we know the language, the sources, the historical and literary context; more embarrassing still, we have a degree and a career built on reading hard texts. To leave the lacuna is to acknowledge publicly our own intellectual gaps. How easy it is to move from ……. to < >, from absence to conjecture.

What follows is a cautionary, and confessional, consideration of editing the lacunose manuscript in an age of technologies—multispectral imaging, statistical processing, neural networks—that provide both aid to, and cover for, editorial decisions. Editing a manuscript is, of course, subtly different from editing a text inasmuch as texts are notional constructs and manuscripts material ones. Of late, that distinction has been further vexed by technologies that challenge the status of a text as a purely human production, as well as the role and responsibility of an editor, by enhancing a reader's ability to see more than what is visible to the naked eye, as well as to recognize patterns that might otherwise be imperceptible to the human mind. My argument will draw primarily on two manuscripts, both of which I have transcribed and/or edited. Throughout the entire process, I am fortunate to have had the best technical help imaginable, both in imaging, image-processing, and later in optical character recognition, what I call forensic palaeography. That said, much of the capture and processing I performed myself, and so the editorial decisions remain, for better or for worse, my own. In other words, my own subjectivity as a textual scholar is to blame at every turn. In the pages that follow, I'd like to worry the problem of tendentious decisions in editing and the role technology plays in them both in theory and in practice.

MATERIAL MOUVANCE

In producing a scholarly edition of a classical or medieval work, and in the absence of an author's autograph copy, how is a textual editor to account for and correct the changes in a work that accrue over the many years and many copies that constitute a 'text'? For centuries, philologists' efforts to solve that problem have been predicated on a semantic distinction between a 'text' and a 'manuscript witness'. When a piece of writing loses material connection to its author, circulating unmoored and unauthorized, it becomes a mere 'text', the notional construct of a literary or historical work.[2] Manuscript witnesses, by contrast, are things: the group of (imperfect) versions or 'variants' that constitute the physical record of a text writ large. The task of the scholar, traditionally conceived, has been to reconstitute the text from manuscript witnesses, or as Giovanni Lamola,

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[1] Aristotle, *Physics* 4, 6–8.

[2] For a more historically-nuanced definition, see Martens, 'What is a Text?'. Martens gives one aspect of the definition of 'text' as 'a complex of all the versions and deviations belonging to a work' (p. 210).

the Bolognese philologist of the first half of the 15th century, put it, 'omnium secundum priorem textum restituere'.[3] In 1968, Nigel Wilson and Leighton Reynolds reaffirmed Lamola's rule when they argued that role of the textual critic is to 'restore the texts as closely as possible to the form they originally had', by which they meant to compare or collate variants and correct mistakes.[4]

Working at the same period as Wilson and Reynolds, Paul Zumthor went so far as to argue for an even more radical notion of the text. Given the significant discrepancies in readings among variants of medieval texts, especially of anonymous works, neither originality nor singularity, he maintained, can serve as a defining quality of the medieval literary work.[5] Rather, scribes, along with their additions and mistakes, participate in the creation of a text as unacknowledged co-authors of a sort. This fluidity in the idea of the text's composition he termed 'mouvance'.

Now, *mouvance* is a term of repute heretofore uniquely associated with one method of 'restoring' (to use Lamola's term *restituere*) the most reliable or best text.[6] Another form of *mouvance*, what I call 'material *mouvance*', plays a less well-known role in the history of textual editing. A manuscript witness decays over time in a variety of ways—fading, damage, palimpsesting, chemical reagents—rendering it less legible. This too is a form of *mouvance*, making an individual manuscript non-identical to itself. Since at least the 16th century, textual scholars have used chemical reagents to revivify text that has become illegible through age, turning back time, as it were, on the individual manuscript witness.[7] Cardinal Angelo Mai is perhaps the best known among scholars who produced editions aided by chemical reagents to reveal palimpsested undertexts, including Cicero's *De re publica* and the complete works of Vergil.

The ethical quandaries of the use of chemical reagents increasingly dogged textual scholars as the effects became better known. First, reagents always damage the manuscript on which they are deployed, leaving it permanently less legible than before. Second, the heightened legibility of a passage is often very short lived, sometimes lasting only a few minutes. Given the damage they cause, are the readings they afford worth the risks to the object? Is the brief window of legibility sufficient time to extract an authoritative reading? If only one scholar has the opportunity to benefit from a reagent-enhanced reading, is that reading inherently suspect because it can never be confirmed or duplicated by other scholars? These issues rose to a level of crisis by the late 19th century, leading to a general prohibition against the practice at the St. Gall International Conference on the Conservation and Restoration of Manuscripts of 1898.[8]

Today, however, various non-destructive imaging techniques have enabled some scholars to 'turn back time' on manuscript witnesses—multispectral imaging, x-ray fluorescence—counteracting material *mouvance* without the deleterious concomitants of chemical reagents. This technology, while widely acknowledged not to do harm,[9] nonetheless poses a variety of ethical and technical problems for those few scholars who are able to employ it, similar to those of the era of chemical reagents. Given the esoteric nature of both the imaging process and the image processing techniques and algorithms, can scholars reliably verify the methods and readings of scholars using these technologies? Can the results be falsified or altered in subtle ways that compromise the authority of readings? Has technology itself become a witness that cannot be interrogated in the process of textual editing? Each of these questions points to what might be called digital lacunae in the process of technology-aided textual editing, which I would like to address in the context of resolving actual, material textual lacunae.

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[3] As quoted in Rüdiger, Die Wiederentdeckung, 553.

[4] Reynolds and Wilson, *Scribes and Scholars*, 207. On the standard editorial practice of collation and recension, see Maas, *Textual Criticism*.

[5] Zumthor, *Essai de poétique*, 72ff.

[6] On 'best-text' method, see Bédier, De la formation des chansons de geste, 30: 'Au lieu de s'épuiser à la recherche des hypothétiques modèles perdus des chansons de geste, il faut les accepter telles qu'elles sont, dans les textes que nous avons.'

[7] In 1759, the Maurist scholar René-Prosper Tassin describes the recipe for and, for the first time, the use of chemical reagents on manuscripts in *Nouveau traité,* 459, note 1.3.

[8] On which, see Posse, *Handschriften-Konservierung*, 4ff.

[9] See Bearman *et. al*., Measuring the Illumination Exposure.

MULTISPECTRAL EDITING: DRESDEN OC. 66

In 2013, Daniel O'Sullivan and I published the first volume of the first edition of the 14th-century French poem, *Les Eschez d'Amours* (Dresden MS oc. 66), a unique manuscript badly damaged in the firebombing of Dresden in 1945 and considered lost. I am currently finishing the second and last volume. Multispectral imaging that I performed in 2009 and again in 2014, and ongoing image processing, provided images of enhanced legibility far beyond what can be achieved with UV lamps. Because the only other witness to the poem was a fragment—Venice Fr. App. 123 (V)—the edition of *Les Eschez d'Amours* relied primarily on this single manuscript from Dresden (D), along with collation from V and occasional scraps of pre-damage transcription of D published in articles in the 19th century.

The Dresden manuscript's numerous lacunae fall into several discrete categories, each requiring different processing methods and levels of editorial intrusion. The most common were faded, water-damaged passages largely illegible in visible light, but clearly legible in multispectral processed images (Fig. 1). Another sort were passages obscured by rubrics that, when the manuscript lay wet at the end of war, had transferred from one folio to another, forming a kind of red mirror-text over black (Fig. 2). The most difficult lacunae were those in which East German conservators in the 1980s used urea to 'wash' excess ink off the folios, causing parts of the manuscript to become translucent (Fig. 3), or in which parts of the manuscript had cracked and crumbled away entirely to be replaced by stabilizing material.

Behind every textual lacuna lies a series of editorial choices and sigla that describe them, organized according to levels of confidence in either traditional text critical techniques (collation from other witnesses) or technologies. Perhaps the most significant editorial choice affecting the *Eschez d'Amours* was silence. Lacunae such as those in Figures 1 and 2 were not even noted critically as constituting lacunae; transcription from multispectral images of passages in which the text had so degraded as to be illegible, or those in which the obscuring transfer rubric was digitally lightened to permit transcription of the *scriptio inferior*, were treated as more reliable than firsthand inspection in visible light. A diplomatic edition, which this was not, may well, and perhaps should have, distinguished between text visible to the naked eye and that legible only through the intermedium of technology. In these cases, I treated technology-enhanced readings as superior in authority to the witness both of the fragmentary variant (Venice) and to that of 19th century transcriptions of Dresden. The most serious damage (Fig. 3), required collation from either the variant V or from pre-damage readings of D when available. When not available, we chose to conjecture (set off in angled brackets) based on partial allographs, aided by the exact measurement of the width of individual letters, number of syllables, and rhyme.[10] In these cases, my transcription of V was placed in the text in italics, while 19th century witnesses of D were placed in square brackets, an implicit hierarchy founded on the extent to which the reading was mediated by other scholars and the proximity to our base manuscript.

The most controversial of our editorial assumptions turned out to be the one to which we gave the least thought. A generally positive review of the edition in *Digital Philology* included the following criticism: 'Given the digital work undertaken, it would be of great interest to many to be able to view the multispectral images taken of MS D (it is digitized here under normal viewing conditions)—making these available online would be of great interest to those wishing to better understand the editorial process under such challenging conditions.'[11] Indeed, understanding the 'editorial process' in the absence of the primary evidence is not only reasonable but necessary. The only reasons we did not provide evidence of the multispectral processed images were the cost and cumbrance of including some in the published edition. That said, technology and its complexities often serve as cover for unscholarly or unethical decisions. The same scientific rigour applied by textual critics such as Lachmann and Maas must, in some way, translate into the era of technology-aided editions.

The need for transparency and rigour is matched by the difficulty of implementation. When multispectral images of a manuscript are captured, they exist in their pristine form as a series of photographs of the same folio under various wavelengths or bands, each revealing slightly different features. While in their raw form they often afford a marginal enhancement to legibility, they are rarely transformative. After capture, the raw

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[10] Like many French poems of the period, the *Eschez d'Amours* is written in rhyming octosyllables. All conjectures were placed in angled brackets, see Heyworth and O'Sullivan, *Eschez*, passim.

[11] Rose-Steel, *Eschéz* review, 300.

images are usually transferred immediately to the institution that owns the object. These are the images that are accessed most easily by scholars and the public and the ones by which they judge the degree of legibility, erroneously so inasmuch as the raw images often reveal only a fraction of what can be read after image processing. Image capture represents less than twenty percent of the work of recovering text. Statistical image processing, often involving such algorithmic interventions as Principal or Independent Component Analysis or Minimum Noise Fraction, is an iterative process of interaction between scholar and image processor, producing multiple different variants of every folio that may take months, or even years. These images offer the most marked changes as manifest in Figure 4 (Henricus Martellus Map under UV, IR, and multispectral). Any multispectral digital facsimile of a manuscript would necessarily need to exist as a digital resource with the capacity *both* to store multiple large images *and* to present multiple versions—processed and unprocessed—of the same passage simultaneously, a practicable but non-trivial endeavour.

More challenging than implementation, however, are the transparency of methods and completeness of metadata that are the concomitants of editions aided by multispectral imaging. To prevent falsification of results, informal standards employed by many of the major practitioners of multispectral imaging for cultural heritage have evolved around the principle of non-destructive editing. The opposite of what we commonly call 'photoshopping', non-destructive editing never adds or subtracts data. Rather, data are enhanced and interpreted using algorithms in such a way that all results are duplicable and reversible, amounting to a series of manipulations that are recorded in metadata that accompany the image. Crucial parts of that process, however, are not easily automated or recorded. In most supervised image processing methods such as Principal Component Analysis and Independent Component Analysis, the imaging scientist selects specific regions of interest (ROIs) in the damaged manuscript that capture the range of spectral characteristics in the form of statistics that the algorithm will apply to a spectral image. On a palimpsest, for example, an ROI might reasonably isolate the *scriptio inferior* alone, or perhaps a range of areas with various types of damage. Like various windows onto the same garden, different ROIs applied to an image set can produce radically different views. And yet, because specific ROIs cannot be easily described mathematically, they are preserved only as spatial subsets, files akin in appearance to a gerrymandered map of a country. To reproduce, and thus to verify, recovered text, one must have access to the original ROIs, which are not commonly transmitted in metadata. Without them, textual readings are without scientific foundation.

While incomplete metadata sets represent unintentional lacunae in the editorial record of an object, other lapses involve intentional alteration of the data. The tacit principle of non-destructive image processing has never been established as standard practice. Between 2001 and 2004, the most important digital imaging project for damaged manuscripts in the world was Rinascimento virtuale. A European project coordinated by the University of Hamburg and funded by the European Commission in Brussels, boasting fifty partner institutions across Europe, Rinascimento virtuale represented the state of the art in palimpsest recovery and research. The group's multispectral imaging team, led by Daniele Broia, developed a method of processing what they termed 'virtual restoration', a technique that produced a clarity both in under- and overtexts that was nothing short of spectacular.[12] Fotoscientifica's reputation for high quality afforded it entrée to the most important collections of manuscripts in Europe, from the Vatican to the British Library, ten years beyond the end of the Rinascimento virtuale project. While the exact details of Broia's method have never been described in technical detail, it began to attract concern among textual scholars. Visually, Fotoscientifica's processed images were remarkable for their lack of 'noise'—that is to say, the piebald smudges and poor contrast typical of damaged parchment. His was a uniformly creamy, mottled beige, regardless of how stained or brown the original. Overtexts were coloured to match the parchment, causing them to disappear like camouflage into the background, while undertexts became uniformly dark brown, magically devoid of motes, and all with sharply defined edges. Only scholars with some sophistication in imaging and image processing could recognize these as examples of retouching—that is, the digital colouring in and erasure of noise that can, with effort, be accomplished by digital image manipulation. Peter Stokes, a noted palaeographer and computer scientist, was among the first to cry foul. Broia's method, as I have learned from scholars who worked with him, seems to have involved creating a typology of letter forms that he would use as a template for 'enhancing'—read 'colouring in'—an undertext.

[12] See http://www.bml.firenze.sbn.it/rinascimentovirtuale/pannello26.shtm (accessed 01.07.2023). High quality images of Fotoscientifica's palimpsest work are difficult to obtain, although I have personally inspected several examples.

Thus, in an article on digital paleography in 2008, Stokes commented acutely: 'In some cases of software designed for palaeographical analysis, as indeed for other applications of digital humanities, it is not clear exactly what the computer is doing, either because the particular technique requires a lot of ad hoc human intervention which is not properly documented, or because the software is proprietary rather than open-source. One example of this is the image enhancement performed by Fotoscientifica, a company which, when led by Daniele Broia, used to recover text from damaged manuscripts using multispectral photography and image enhancement (Fotoscientifica). Their results were spectacularly successful and yet their services were sometimes not used because of concern about the degree to which they enhanced and the lack of openness about what they had enhanced and how they had done it.'[13]

A prerequisite to any future technology-aided editions should take its cues from Stokes's warnings. All methods of image processing and capture must be able to pass basic tests of transparency, openness, and scientific reproducibility while adhering to an ethical standard of non-destructive image preparation. Granting agencies and publishers alike must be encouraged to agree upon these standards, and agree as well to provide image evidence for all readings. For some, this copiousness of supporting data and metadata is not only cumbersome, but inherently dangerous to the authority of textual editors whose readings of lacunose texts will necessarily attract attention through an open online publication of their base image data. A. S. G. Edwards is among those textualists for whom the chimera of digital facsimiles as concomitants to editions threatens more than it gives benefit. Thus, in an article in the *Times Literary Supplement* entitled 'Back to the Real?' he impugns the value of digital surrogates, with specific reference to the digital *Codex Sinaiticus* that had attracted over 10,000 hits a month from the general public. 'That might seem a strong justification for digitization', he argues, 'but it seems doubtful whether even a small fraction of that number have the appropriate training—codicological, linguistic and textual—to approach the work in an informed way. If my audience analysis is even broadly correct, the British Library is investing not in scholarship, but in a new branch of the entertainment industry'.[14]

Indeed, demands for an open forum for a branch of scholarship that is inherently esoteric and specialist-driven would place the entire field at risk to uninformed scrutiny. Of course, such has always been the case in many technical fields—medicine, engineering, physics, law. More perilous still, however, is the undermining of readers' confidence in the literary copestones of our culture. Until the technologies that mediate our understanding of our collective cultural heritage can be rendered if not transparent, then openly accessible and comprehensible, we are obliged as textual scholars to tread the slippery slope, as Vergil reminds, 'hoc opus, hic labor est'.

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[13] Stokes, Computer-Aided Paleography, 321.

[14] Edwards, Back to the Real?

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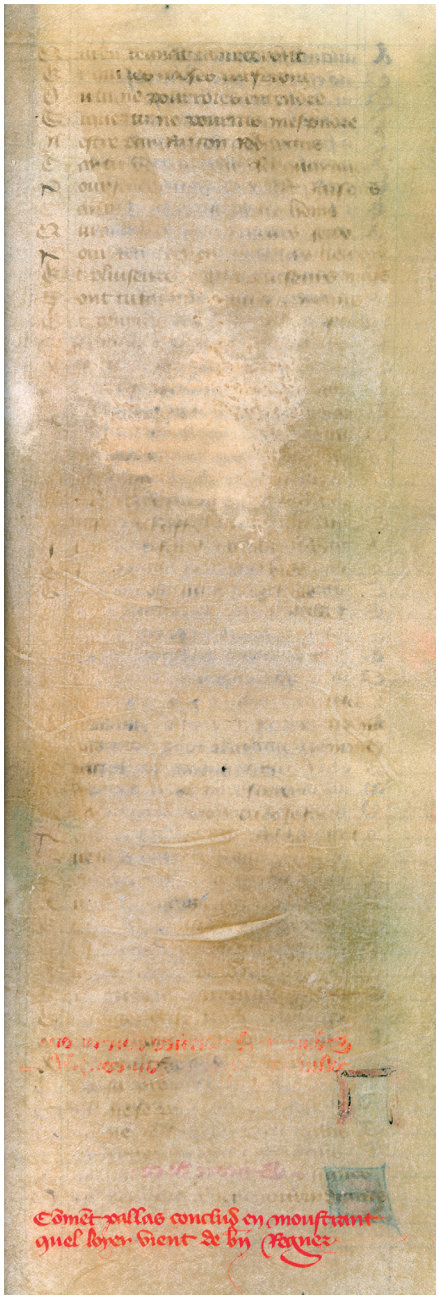
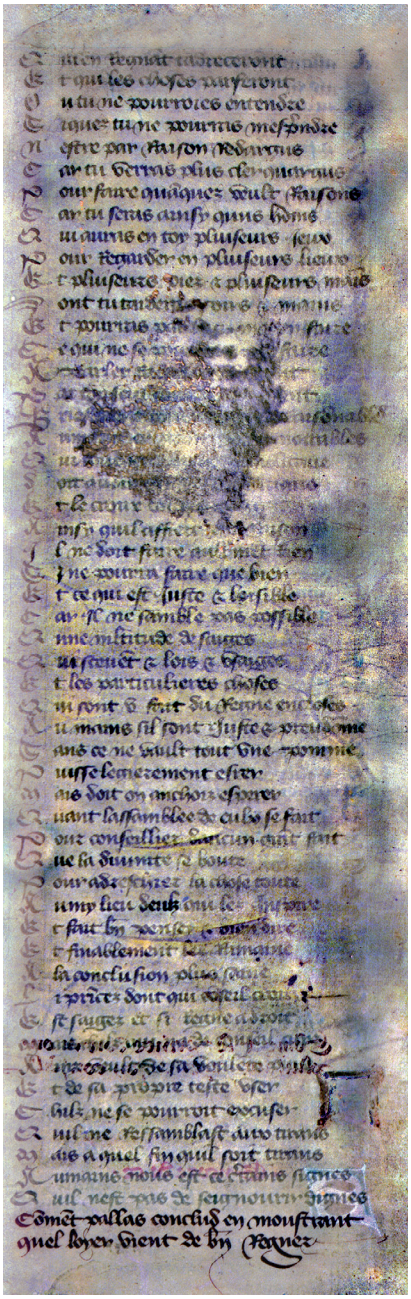
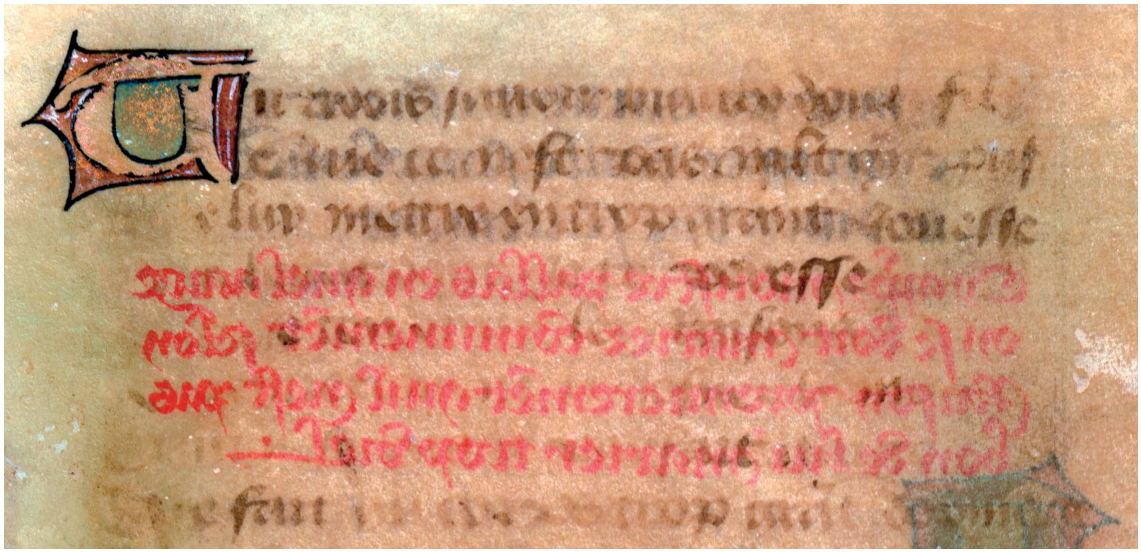
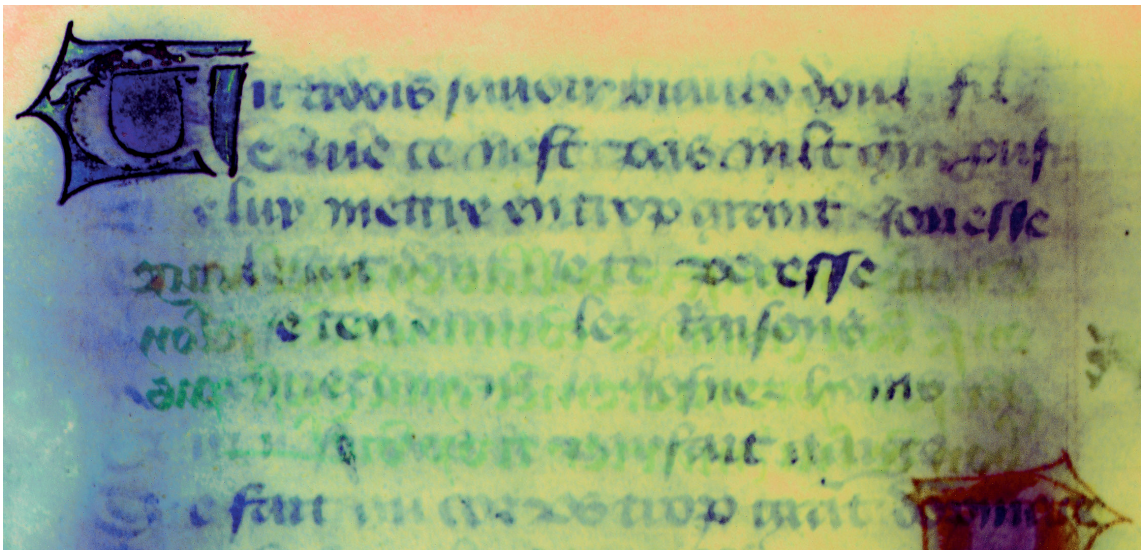




Qui en regna(n)t tadreceront
Et qui les choses parferont
Ou tu ne pourroies entendre
Siquez tu ne pourras mesp(re)ndre
Nestre par raison redargus
Car tu verras plus cler quargus
Pour faire qua(n)quez veult raisons
Car tu seras ainsy quns ho(m)ms
Qui auras en toy pluiseurs jeux
Pour regarder en pluiseurs lieux
Et pluiseurs piez et pluiseurs mai(n)s
Dont tu taideras soirs et mains
Et pourras par la ... m...n faire
Ce qui ne se pou..... et p<ar>faire
A parler rais<onnable>ment
Par toy seul.....ent
Brief<m>en<t> tous..... <r>aiso(n)nables
Auma<ins>..... m... nottables
Qui tous ...et.....<pu/ob>blicque
Doit auoir .....<domes/auten>tique
Et le croire tel {1s}son
Ainsy quil affiert ..... raison
Il ne doit faire ault(re)me(n)t rien
Si ne pourra faire que bien
Et ce qui est juste et loisible
Car il ne samble pas possible
Qune m(ou)ltitude de saiges
Qui sceue(n)t et lois et vsaiges
Et les particulieres choses
Qui sont v fait du regne encloses
Au mains sil sont justes preudo(m)me
Sans ce ne vault tout vne pomme
Puisse legierement esrer
Mais doit on anchoiz esperer
Quant lassamblee de eulx se fait
Pour conseillier daucun gra(n)t fait
Que la diuinite se boute
Pour adreschiez la chose toute
Au my lieu deulz qui lez inspire
Et fait b(ie)n penser et bien dire
Et finablement lez ramaine
A la conclusion plus saine
Li pri(n)ces dont qui co(n)seil croit
Est saigez et si regle a droit
Mais chilz qui na de conseil cure
Ainz veult de sa voule(n)te pure
Et de sa propre teste vser
Chilz ne se pourroit excuser
Quil ne ressamblast aux tirans
Mais a quel fin quil soit tirans
Aumains nous est ce c(er)tains signes
Quil nest pas de seignourir dignes
Co(m)me(n)t pallas conclud en moustrant
quel loyer vient de b(ie)n regner

Fig. 1(a-c): Dresden OC66, f. 81r, *Eschez d'Amours* (RGB, MSI, transcription)
(© Sächsische Landes- und Universitätsbibliothek Dresden)





T u redois sauoir biaulx doulz filz
Que ce nest pas m(ou)lt g(ra)nz p(ro)ufiz
De luy mettre en trop grant jonesse
Et lestat dont je te peresse
Et je ten diray lez raisons Premierement li josnez homs
Qui nest pas de parfait aaige
Se fait au corps trop gra(n)t do(m)pmage

Fig. 2(a-c): Dresden OC66, f. 112v, *Eschez d'Amours* (RGB, MSI, transcription)
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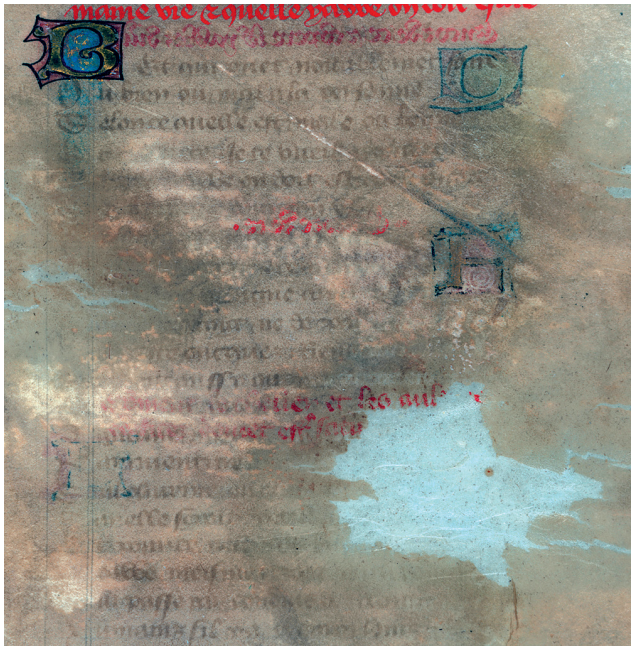

Co(m)me(n)t yavve est neccessaire a humaine vie et quelle yavve on doit eslire
B riefment cest chose neccessaire
Et qui puet nottableme(n)t faire
Ou bien ou mal a la personne
Selon ce quelle est male ou bonne
Et p<ou>r ce je te vueil app(re)ndre
Quelle yavve on doit eslire ou p(re)ndre
Se.....t pour son vser
E.....uelle on doit re<garder>
.....garder premi<erement>
<Quel>le ne viengne au<cunemen>t
De lac destang ne de pal<ut>
Car ceste oncquez riens <ne> valut }
On doit aussy quoy a .....er...
B(ie)n garder que l<ya>vv<e>.... }
Daucune minure.....
Par auenture ny..... }
Sulphurine ou alu<mineux>
Car elle seroit perille<ux> }
Et pour ce nest pas b(ie)n s<eure>
Leavve meismez par nature
Qui passe par conduis de plong
Aumainz sil y a chemin long

Fig. 3(a-c): Dresden OC66, f. 142r, *Eschez d'Amours* (RGB, MSI, transcription)
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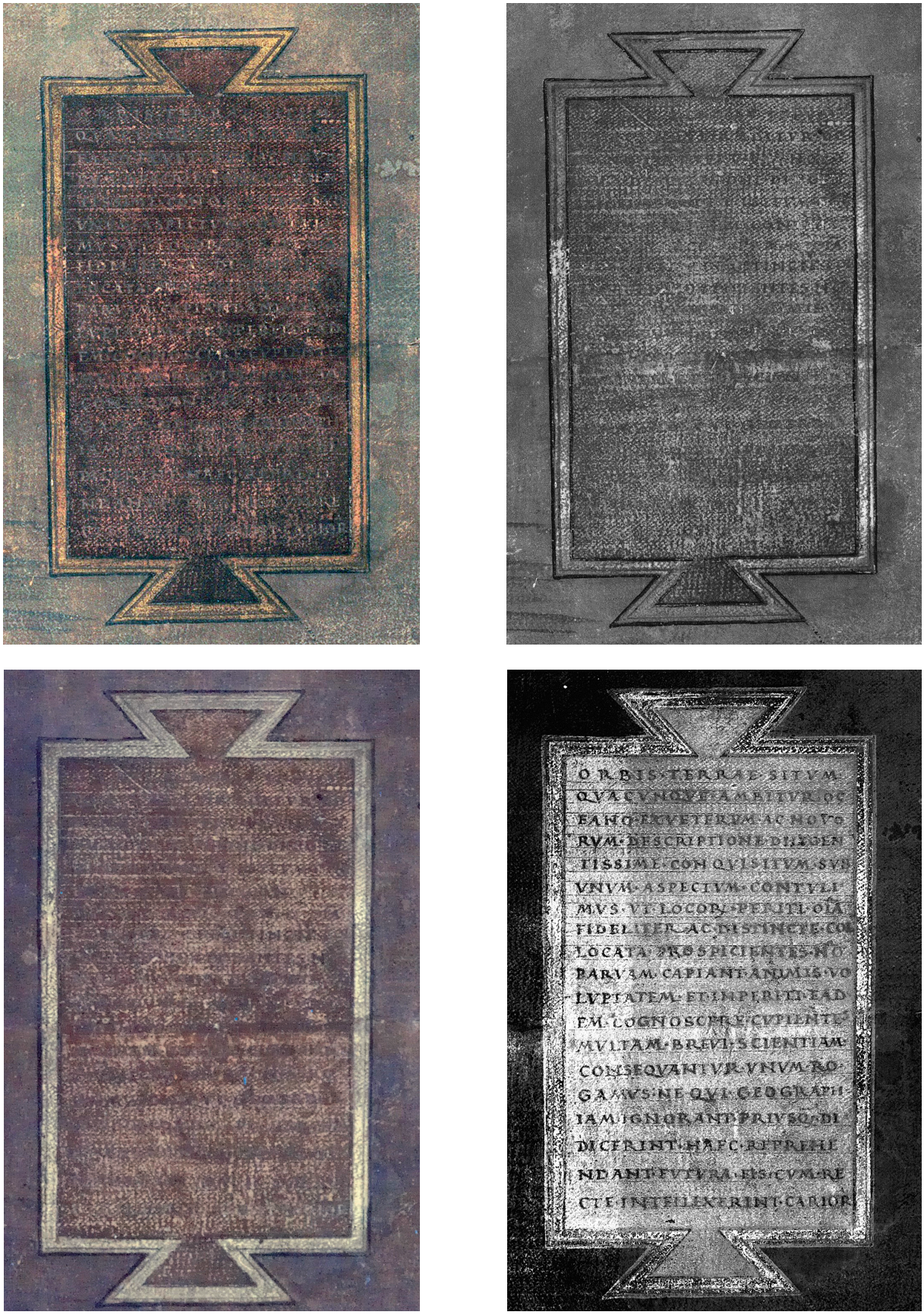

Fig. 4(a-d): Yale University, Beinecke Library, Henricus Martellus Map, 1491 (RGB, UV, IR, MSI)
(© Beinecke Library, Yale University)

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András Németh

Interactive Learning in Palimpsest Research*

Among the Vatican Library's exceptionally rich holdings (more than 80,000 manuscript items and more than 100,000 archival units), many contain recycled parchment folios. More than 620 such library items have been identified so far,[1] including those containing writing surface with barely-legible underlying documentary texts which were physically erased prior to reuse.[2]

The number of individual manuscripts whose writing surfaces were recycled in this way is much higher. If a manuscript includes recycled folios, they normally derive from more than one parent manuscript—quite often from four or five manuscripts. This number can be as high as ten in exceptional cases, as in Pal. lat. 24. The undertexts in the Vatican Library include at least 14 different languages (Latin, Greek, Arabic, Church Slavonic, Syriac, Christian Palestinian Aramaic, Coptic, Armenian, Georgian, Gothic, Anglo Saxon, Italian, *langue d'oïl*, and Batak), a fact that on its own shows the great variety in the origins of such manuscripts.[3]

Palimpsest manuscripts have arrived at the Vatican Library since its foundation in the mid-15th century via diverse channels; thus they reflect a rich variety of contexts and circumstances in which manuscripts were reused. To take one well-known example: St. Columban's Monastery in Bobbio, an early Benedictine Abbey in North Italy, can be viewed as a parallel to St. Catherine's Monastery in Sinai, since important ancient manuscripts were assembled and reused in both.

The faint and often invisible traces of discarded texts will perhaps never permit a successful systematic survey: given the scale of the Vatican Library, it is not possible to distinguish all the palimpsest folios and clarify their complex histories. Nevertheless, their number has continuously been growing during the digitization project, which includes a survey phase when each manuscript selected for digitization is carefully checked in the Conservation Workshop: among various aspects of the manuscript considered, it is established whether or not it contains recycled folios.

The manuscripts in which folios with multiple layers of scripts are identified then follow a special path in the digitization workflow. Each palimpsest page with the slightest promise of legibility is normally reproduced in two different scans or photographs, both in exactly the same position, one with natural light and the one with visible fluorescence generated by UV light. At the end of the digitization project, these two—or in exceptional cases three or four[4]—images per page are published on the visualization platform of the Vatican Library to make them easily accessible to interested readers all around the world. This collaborative teamwork between

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* I thank Irmgard Schuler and Carola Fontana for their help with the images of palimpsests reproduced in this article.

1 The most exhaustive list of Vatican palimpsests available in public is by Voicu, Note sui palinsesti with bibliography on previous lists of Vatican palimpsests which were available to him. Voicu's provisional list of shelfmarks reflects the state of research more than ten years ago and does not give helpful clues for the individual items.

2 See, for example, Vat. lat. 815, f. 48r.

3 The Vatican Library possesses erased undertexts in less frequent languages such as Anglo-Saxon (Reg. lat. 497, f. 71), Arabic (e.g. Vat. sir. 623. pt. 2 [*Diktyon* 69457], ff. 115+122, 116+121; Vat. gr. 1456 [*Diktyon* 68087], ff. 150–152, 155–157), Armenian (e.g. Vat. sir. 623. pt. 2, ff. 197+204, 214+215), Christian Palestinian Aramaic (e.g., Vat. sir. 623. pt. 2, ff. 105–114, 173–180, 189–196, 198–203), Church Slavonic (e.g. Barb. gr. 388 [*Diktyon* 64931], passim), Coptic (e.g., Borg. copt. 109, cass. 15, fasc. 53, f. 1), Ethiopic (Vat. etiop. 39, ff. 1–88), Italian (e.g. Vat. lat. 1907, ff. 151–154, 198, 203), *langue d'oïl* (Vat. lat. 5334, ff. 125r, 126r–v), and Gothic (Vat. lat. 5750, pp. 57/58, 59/60 and 61/62). Delio Vania Proverbio recently identified a Mandailing- and Simalungun-Batak script from the Indonesian Island of Sumatra (Vat. ind. 41). I thank him for sharing with me his identification of both overlapping scripts in the same manuscript, which was copied on the bark of a local tree (Aquilaria Malaccensis).

4 See, for example, Pal. lat. 24 (https://digi.vatlib.it/view/MSS_Pal.lat.24 [accessed 01.07.2023]), Vat. gr. 770 (*Diktyon* 67401, https://digi.vatlib.it/view/MSS_Vat.gr.770/ [accessed 01.07.2023]) and Vat. gr. 788.pt.B (*Diktyon* 67419, https://digi.vatlib.it/view/MSS_Vat.gr.788.pt.B [accessed 01.07.2023]).

the conservator, the photographer, the specialist of image processing, and the IT specialist aims to provide scholars with the best possible means to study the Vatican Library's holdings.

Since 2014, I have had the privilege to follow this process from the point of view of the scholar, the target audience of the published images. My main goal was to assist the Library's aim to make the highest possible number of its massive stock of digitized palimpsest pages available to their end users in an easily-manageable way. A joint project of the Vatican Library and Stanford University Libraries has helped me in this activity.

In September 2016, the Vatican Library and Stanford University Libraries began a three-year joint project on the implementation and enhancement of interoperability protocols (IIIF) for digitized manuscripts, supported by a generous grant by the Andrew W. Mellon Foundation and supervised by Paola Manoni, the chief metadata engineer of the Vatican Library.[5] The Vatican Library offered its images already taken according to the criteria described above, and the scientific experience of some of its academic staff, to curate thematic itineraries or pathways. With the generous help of The Andrew W. Mellon Foundation, the Vatican Library hired young scholars to assist the curators' work, edit the thematic pathways, and help the IT group of the Stanford University Libraries and the Vatican Library to develop various software that enable improved functionality of the digital material presented on its webpage. I joined the small group of curators at the Vatican Library and took the responsibility of curating the thematic pathway *Vatican Palimpsests: Digital Recovery of Erased Identities*.[6]

In this paper, I summarize how I used this framework to prepare an interactive learning tool for palimpsest research. Before entering into the details, I give a brief summary on the preconditions: the basic framework for presenting metadata linked to Vatican manuscripts with recycled folios, as well as the principles of imaging palimpsest pages at the Vatican Library.

Today scholars can access Vatican manuscript data online through two main channels. The most important one is the electronic catalogue of the Vatican Library. This catalogue makes a significant part of the Vatican collection retrievable by variables linked to sections of manuscripts that are distinguished by the individual works present in each. Now, the contents of palimpsest folios can also be retrieved together with those of the overtexts of the manuscripts. The metadata present in this electronic catalogue are linked to the other channel, the Digital Vatican Library (hereafter DVL, https://digi.vatlib.it [accessed 01.07.2023]) with IIIF compatibility. It includes all pages of complete manuscripts with the flyleaves, binding, and edges in the sequence in which they feature in each. A retrievable analytic list of contents permits browsing within the manuscripts. The various palimpsests are distinguished as *inf. 1* or *inf. 2*, and the double palimpsests as *inf. 1.1* and *inf. 1.2*, with the abbreviation *inf*. referring to *scriptio inferior*. The thumbnail images of the entire manuscript can be visualized underneath the enlarged version of the image of the selected page.

Let us take a brief look at the practice of imaging palimpsests at the Vatican Library. After the conclusion of the EU project Rinascimento virtuale (2001–2004), the Vatican Library began to digitize its manuscripts with palimpsest folios in 2006, and named this specialized digitization activity the Cicero Project—after its best-known palimpsest, the *Republic* of Cicero (Vat. lat. 5757). For pragmatic reasons, the administration of the Vatican Library decided to capture—with special high-resolution scanners adapted to this task or, when necessary, with special photographic cameras equipped with appropriate lighting systems—and archive two digital versions of each digitized palimpsest page at native resolution and original format, which would remain available for eventual analysis and minimize the future need for new imaging. These images were initially not intended to be published online. After the scans and photographs of many of the manuscripts with recycled writing surface had been assembled, the Vatican Library began to revise and publish them online on the same platform as other manuscripts. The Vatican Library seeks to provide its readers with an additional UV fluorescence image of all pages which cannot be read and analyzed through their natural light images, not only palimpsest pages but also those with faded annotations, water damage or other circumstances. These additional

[5] On the metadata of the Vatican Library, see Manoni, Metadata framework and application profiles. On the collaborative Mellon project, see Manoni, The Mellon Project at the Vatican Library.

[6] Four thematic pathways have been published: Courses in paleography (Greek and Latin, from Antiquity to the Renaissance), curated by Ambrogio Piazzoni and Timothy Janz; The evolution and transmission of texts of specific works: Latin classics, curated by Marco Buonocore; The humanist prince's library: Federico da Montefeltro and his manuscripts, curated by Maria Gabriella Critelli; and The Vatican Palimpsests. See https://spotlight.vatlib.it/ [accessed 01.07.2023].

images are integrated in the manuscript display immediately following the images captured in natural light. The number of digitized manuscripts which include such integrations now number more than 700.

At the launch of the Cicero Project, two colour images, one with natural light and another one with visible fluorescence generated by UV light, seemed to be sufficient in most cases for later decipherment. This digitization practice remained in use, but the technical equipment and the acquisition methods of the Vatican Library underwent a substantial development.[7] In addition to the scans in very high resolution with UV light (365 nm), the photo laboratory of the Vatican Library now has at its disposal photography equipment for imaging with visible light, ultraviolet fluorescence, and infrared radiation at three different wavelengths as well as with the instruments for imaging by trans-illumination. Multispectral imaging with monochrome camera has recently facilitated important new discoveries at the Vatican Library.[8] In 2021, the Library acquired a Phase One camera equipped with two different lighting systems in broad and narrow bands. Most complex palimpsest folios such as double palimpsest or darkened palimpsest folios previously treated with gallic acid are normally imaged with cameras instead of scanners.

Most of these images now get published online, but the photographs of some manuscripts remain accessible only in the Vatican Library's photographic archive for eventual scholarly studies. In fact, the palimpsest images that are published in the Vatican Library's DVL are elaborations done on native RAW or TIFF files; these files are likely to be reinterpreted in the future thanks to new processing approaches. On the publication platform of the Vatican Library (DVL), each manuscript with recycled writing surface is accompanied by a collation of the included gatherings or quires, which enables readers who cannot access the original manuscript to establish the correspondence between the two parts of any of its folded pages.[9] The Vatican Library's approach, as we have just seen, is all-embracing with a constant need of hosting and integrating images produced over a long span of time with diverse methods and often multiple versions of the same page. What I would like to explore in more detail is the interactive presentation of palimpsests.

Instead of trying to give an overall picture of the Vatican palimpsests—an impossible task—I will focus on the thematic pathway *Vatican Palimpsests: Digital Recovery of Erased Identities* (https://spotlight.vatlib.it/palimpsests/ [accessed 01.07.2023]), which has been available to the public since October 2019, and how it seeks to explore new dimensions of presenting palimpsests to a more general readership. Exploring these palimpsests is always a laborious but exciting experiment, where success is not guaranteed. From the reader, it requires an adequate knowledge of the handwriting of ancient texts—assisted by the Bibilotheca Vaticana's parallel Greek and Latin Palaeography Pathway, jointly curated by Ambrogio Piazzoni and Timothy Janz—as well as familiarity with the language of the text to be deciphered, its context, and a great deal of intuition and capacity to make creative conjectures. Such an experiment involves repeated and persistent attempts and failures. Supported by the technical assistance available, successive interactions between the reader and the barely legible text often offer surprising results and certainly develop the reader's experience.

The implementation and enhancement of interoperability protocols (IIIF) for digitized manuscripts, the focus of the joint project between the Vatican Library and Stanford University Libraries, puts efficient tools into the readers' hands, allowing them to practise the interactive exercise of exploring palimpsests, beyond the ivory tower of a few privileged specialists. For this project, the Vatican Library offered its various types of metadata and scholarly narratives as an experiment in order to test and enrich the functions of two software that the IT team of Stanford University are developing.

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[7] On the Cicero Project and the actual practice of palimpsest digitization and photography of challenging manuscripts at the Vatican Library, see Schuler *et al*., Oltre il visibile.

[8] For example, I recently managed to recover—together with Jana Grusková—Dexippus' preface to his *Scythica* in Vat. gr. 73 (*Diktyon* 66704), f. 54r: see Németh, Dexippus in the Excerpta Constantiniana revisited. In addition, in the same manuscript, I completed a fragment from Polybius Book XXXVIII: see Németh, The suicide of Hasdrubal's wife revisited. These results are based on Michael B. Toth's multispectral imaging session at the Vatican in September 2017 and William Christens-Barry's processing of these images. See also the multispectral imaging sessions which EMEL carried out in 2014, 2015, and 2016–2017 on Vat. sir. 623. pt. 2, ff. 211+218, 212+217, which are double palimpsest bifolios with Menander as the oldest undertext, and ff. 115+122, 116+121 (the Arabic translation of Theon's commentary on Ptolemy's *Handy Tables*), f. 227 (the *Syriac Galen*), and Vat. sir. 647, ff. 38–39 (also the *Syriac Galen*).

[9] E.g. Vat. lat. 5757 (https://digi.vatlib.it/view/MSS_Vat.lat.5757 [accessed 01.07.2023]), Pal. lat. 24 (https://digi.vatlib.it/view/MSS_Pal.lat.24 [accessed 01.07.2023]). All the collations that are available at this moment have been established by the author of this article.

(1) *Mirador* viewer (http://projectmirador.org [accessed 01.07.2023]) is the reader's interactive 'exploration laboratory', a IIIF compatible visualization platform which offers didactic and experimental tools. It presents a manuscript as a single linkable entity which is furnished with a full set of metadata. Each *manifest* refers to a sequence of images that are linked to a documentary unit, in this case a manuscript. The pathway of *Vatican Palimpsests* explored *Mirador*'s capacity to integrate these additional identities within the same *manifest* both in terms of adapting the sequence of images to these special manuscripts, as explained above, and the metadata which record and highlight the basic set of information linked to them. As one might expect, *Mirador*'s IIIF compatibility permits parallel visualization of the same *manifest*, i.e. the comparison of multiple variants of the same page or manifests of other manuscripts from anywhere in the world which are published online. *Mirador*'s particular visualization and virtual enhancement tools (rotation, brightness, contrast, saturation, grayscale, inversion, mirror, and return to the default version) are especially useful in deciphering the images of palimpsests that are difficult to read. The mirroring function, for example, was added with the *Vatican Palimpsests* pathway in mind, in order to visualize the results of an accidental transfer of the script when the writing surface was repurposed. It took place at the scriptorium where the parchment bifolios of an old manuscript were washed clean and then recycled in the early 13th century in South Italy (see below Vat. gr. 316 [*Diktyon* 66947]). In the sequence of images, *Mirador* viewer is able to add modified versions of an image which is different from its default version, i.e. parallel visualization of the same page according to the overtext and undertext.[10] Annotations in *Mirador*, which can be switched on and off, serve principally didactic purposes: they highlight and explain various phenomena linked to specific zones on the manuscript page. When a palimpsest page is presented, for example, it is useful to transcribe a portion of the discarded undertext which is most often poorly visible and is oriented in a different way compared to the overtext. Such a transcription assists further decipherment of the same palimpsest. Any aspects of the page can be highlighted and explained. In addition to the text itself, each annotation has an author who created it and tags which make it retrievable by various research criteria.

(2) *Spotlight* (https://spotlight.vatlib.it/ [accessed 01.07.2023]), the second of these two software, can be regarded as the readers' virtual schoolroom. It hosts scholarly narratives in a hierarchical structure between parent and child pages which explain various features of the exhibit items. In addition to the creative integration of these narratives, *Spotlight* offers curators a wide range of options to link and visualize not only static single images but also integrated *Mirador manifests* which function as doors that open to the 'exploration lab' (*Mirador*) with its range of functions listed above. I will give below a few examples of presenting palimpsest pages in *Spotlight*.

These two tools not only improve the presentation and the study of manuscripts with palimpsest writing surface, but also put an interactive learning tool into the hands of students who study palaeography, codicology, philology, book conservation, and indeed anyone who wants to know more about the mysterious and arcane world of palimpsests.

As far as the scope is concerned, the *Vatican Palimpsests* pathway acknowledges the recycled versions of more common and more easily accessible texts which are potentially useful instruments for teaching purposes. Domenico Surace, the editor of the *Vatican Palimpsests* pathway, described the manuscripts in the electronic catalogue of the Vatican Library, uploaded the metadata to the system, and provided annotations and the Italian translation of the scholarly narratives. As a curator, I am responsible for these scholarly narratives, together with the conceptual structure of the *Vatican Palimpsests* pathway.

The twenty-four manuscripts selected for the project include such famous and important items as the unique copy of Cicero's *De re publica* (Vat. lat. 5757),[11] and Pal. lat. 24, which includes the first palimpsest discovered in the Vatican Library, in 1772.[12] It includes nine palimpsests, fragments from nine Late Antique Latin manuscripts, and a Greek one, many of them unique testimonies of the text they contain.[13]

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[10] See, for example, Pal. lat. 24 (https://digi.vatlib.it/view/MSS_Pal.lat.24 [accessed 01.07.2023]), ff. 43v (Seneca), 46r (Fronto). I acknowledge the work of Sean Martin, who implemented these rotated images in the *Mirador* viewer.

[11] See the description of the *scriptio inferior* and the *superior* with up-to-date bibliography in Németh, Recovery of Conflicting Textual Identities.

[12] See the description of the discovery in Cancellieri, In T. Livi fragmentum ἀνέκδοτον praefatio, ii–viii. Németh, Reproducing the invisible: the early observation of palimpsests, 518–520.

[13] Fohlen, Recherches sur le manuscrit palimpseste Vatican, Pal. lat. 24.

The range of the cultural contexts present in the overtexts and undertexts of these selected manuscripts is very wide: lectionaries from different periods, hagiographic texts from special and standard collections, school texts, legal texts, and historiography, as well as philosophical, homiletic, medical, patristic, biblical, and liturgical texts. Some of these recycled manuscripts reveal the original contexts of their production and have undersigning by their scribes. They were copied in various locations that include the Abbeys of Bobbio and Lorsch (?), Grottaferrata, Salento, and the Monastery of St. John Prodromos in Petra (Constantinople). There is plenty of scope for readers to make new discoveries, either in the texts we could not identify or by deepening the study of other palimpsest folios where the text is known but the full manuscript invites further study.

Let us now address the major challenges that may be posed by the integration of manuscripts with recycled folios into a database which was devised for manuscripts without recycled folios and overlapping identities. The multiple identities of these manuscripts do not coincide at a conceptual level and in physical reality. For example, the multilayered texts on a parchment folio which was washed clean and rewritten twice carry three independent identities.[14] Each of these identities belong to different manuscripts and have different histories which came together at a certain point. To the human mind, a text and the book that carries that text normally coincide. It is difficult to talk about the same manuscript which includes fragments of more than one independent identity, or about a textual identity which was diffused across several different objects—books—by recycling.[15] This ambiguity often creates confusion and lack of clarity in discourse relating to recycled manuscripts, and in the presentation and retrieval of such manuscripts. For an insight into the *Vatican Palimpsests* pathway, let us enter the classroom and see the first page in *Spotlight* which provides the general reader with a short set of terminological clarifications.

TERMINOLOGICAL CLARIFICATIONS

The word *palimpsest* is an adjective or an adjectival noun and comes from Greek. It means ‘a manuscript scraped clear for reuse’. The two Greek compounds of this word, παλίν (*palin*; literally ‘again’) and ψάω (*psao*; ‘scrape’) refers to the process of cleaning the writing off the parchment, using a technique similar to the one used for the preparation of the animal skin for its first use as writing material. However, the term is problematic for two major reasons.

First, the concept of removal of texts that the word signifies is misleading, because it does not correspond to the process more commonly used to produce palimpsests. In fact, scraping off the unwanted text was only one of the two main methods available, and was not even the technique most frequently used for the erasure of script. The second method, washing off the unwanted text, without scraping off the written layer of the parchment, was used more often; this is actually why we are able to uncover what was erased, since layers that were physically removed are almost impossible to re-establish. In addition, the term does not completely cover the concept, because not all washed or scraped parchment sheets were reused for writing.

The second reason is that the adjectival noun ‘palimpsest’, which takes its identification from the removed text, often designates in colloquial use the entire manuscript which includes that part. For example, the *Archimedes Palimpsest* is a reference used for the actual manuscript: a Byzantine prayer book that includes the palimpsest fragments from the sole existing medieval manuscript of Hyperides, which were recycled, together with fragments from several other recycled manuscripts, to create this volume.

In order to avoid confusion caused by the ambiguities of the term ‘palimpsest’, I suggest using the term ‘palimpsest’ exclusively as a noun to identify the section(s) of current manuscript(s) which derive from the

[14] See various double palimpsests in Vat. gr. 633 (*Diktyon* 67264), Vat. gr. 788. pt. B (*Diktyon* 67419), Vat. gr. 984 (*Diktyon* 67615), Vat. gr. 1853 (*Diktyon* 68482), and Vat. gr. 1882 (*Diktyon* 68511).

[15] See Simplicius’ commentary on Aristotle’s *Categories* in Vat. gr. 21 (*Diktyon* 66652) and Urb. gr. 154 (*Diktyon* 66621), both of which are included in the Vatican Palimpsests pathway. The Late Antique manuscript of Strabo which was later reused for a Byzantine *nomocanon* manuscript in the 7th or 8th century was recycled in at least three manuscripts: Vat. gr. 2061. pt. A (*Diktyon* 68691), Vat. gr. 2306 (*Diktyon* 68937), and Crypt. A.δ.XXIII (*Diktyon* 17517, in Grottaferrata). Each of these manuscripts also includes other palimpsests.

same discarded manuscript, regardless of their circumstances; that is, regardless of whether the redundant texts were removed by erasure or washing, regardless of whether the various pieces of the discarded manuscripts were recycled in one or more extant manuscripts. By identifying a palimpsest in such a way, I do not identify the entire actual manuscript which contains it.[16]

The other term frequently used is the Latin passive participle *rescriptus* (literally, 'rewritten'). This word implies the end result of the process, which is equally misleading, for two reasons. First, not all rewritten manuscripts or those with multiple layers had previously been treated to remove the unwanted text.[17] Second, not all manuscripts that were pre-treated for the purpose were actually reused for writing.[18] Still, all manuscripts that are called 'palimpsests' or *rescriptus* represent the same phenomenon of recycling the same writing surface for a writing project different from the previous one.

A third expression, the Latin *membra disiecta* ('disjointed body parts') is also used to refer to the result of recycling one or more book(s) to become another book or books; it is 'dismembered' or 'disjointed' because the structural relationships of the 'body part' of the recycled book or books do not correspond to those of the actual book(s) in which the writing surface of discarded books were reused. These distinctions create a fascinating field of study: the archaeology of the book. We shall see two case studies below which will illustrate this method. This is somewhat similar to the concept of *spolia* ('spoils') in archaeology, which refer to archaeological elements that were later recycled in buildings constructed in very different contexts—such as, for example, the columns of the Baths of Caracalla which were transplanted to the Church of Santa Maria di Trastevere in Rome.

The concept of the fragment clarifies the use of the expression *membra disiecta* in the context of palimpsests. Just as the analogy of fragments from ancient objects, inscriptions, and statues led to the abstract concept of a textual fragment that represents the whole text of which it constitutes a part,[19] a small surviving portion of a book can be viewed as a fragment of the whole and as somehow representing it. It is often possible to draw more-or-less precise conclusions concerning the volume, date, nature, contents, as well the contexts of production and the use of the lost ancient books, even from tiny surviving fragments. This is possible thanks to the auxiliary disciplines of palaeography and codicology, which carefully compare the script, contents, and traces of the production of the manuscript. This last aspect makes the study of the palimpsest close to archaeology. At the same time, palimpsests are similar to papyri or incomplete inscriptions, which may be regarded as similar to both jigsaws and crossword puzzles. Like jigsaw puzzles, palimpsests may contain recycled larger folios that are often folded in half or trimmed and cut into smaller sheets, the original structure of which can be reconstructed. The process of deciphering the erased or washed texts is similar to that of solving crossword puzzles, where the textual contents and the legible letters constitute the basis of reconstruction which often includes conjectures about the missing links in order to arrive at a more-or-less clear and consistent picture of what can be drawn from the manuscript which was once dismembered.

Let us look now at a manuscript which can be used as an example to illustrate the series of challenges presented by manuscripts with palimpsests.

CASE STUDY: VAT. GR. 984

On 20 May, 1354 the second scribe of the overtext of Vat. gr. 984 (*Diktyon* 67615) finished the *opera omnia* of Flavius Josephus, the famous Jewish historian.[20] This scribe used fragments of three palimpsests, of which two are important. The bulk of Vat. gr. 984 was copied onto the remains of a very large systematic collection of saints' lives, arranged by their feast days. The other significant manuscript used is a double palimpsest.

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[16] On the reinvention of terms palimpsest and *rescriptus* in early antiquarian philology, see Németh, Reproducing the invisible: the early observation of palimpsests, 511–517.

[17] See below the flyleaves of Vat. gr. 316.

[18] E.g., Vat. lat. 1715, ff. 74–124.

[19] Most, Fragments.

[20] Vat. gr. 984: (ff. 1r–173r) *Jewish Antiquities*, (ff. 173v–184v) *Life of Josephus*, (ff. 186v–344v) *Jewish Wars*, (Vat. gr. 1882, ff. 89v–92v, 100r–v, 97–104) *Maccabees*. At the end of the codex (Vat. gr. 1882, f. 103v), an Easter table was added for the years from 1354 to 1370. See the undersigning of the second scribe on f. 344v (Fig. 1) who copied ff. 4v lin. 20 – 197v, 141r–344v, and also corrected f. 240v; his colleague copied ff. 1r–4v, lin. 20, 198r–140v. Turyn, *Codices graeci Vaticani*, 149–150, Tab. 123–125, 195c.

This manuscript of Flavius Josephus suffered a small accident during the course of classification and relocation in the Vatican Library, where it arrived before the end of the 16th century. It was initially classified as belonging to the group of manuscripts of secondary importance and was stored in a box.[21] The last 12 loose folios of Vat. gr. 984 were separated and joined the group of manuscript fragments of diverse origins in the 17th century. Mons. Paul Canart discovered them, and only now has it become possible for the two parts of the same object to be unified virtually on the *Mirador* viewer.

(1) On the basis of its pure and very regular miniscule script, the large recycled manuscript of saints' lives can be dated to the early 10th century.[22] The saints' lives were copied in two columns with 30 lines in each, measuring ca. 32.5 × 6 cm, and large margins (ruling type: 46D2). The codex contained the lives of saints whose feasts fall from June 1 to 17 (or later, depending on the feast day of Hypatius). It probably belonged to a collection of saints' lives with two volumes per each month.[23] [Tab. 1] This is the most ambitious collection of the genre that has survived, and predates the organizational project undertaken by Symeon Metaphrastes some decades later.[24] In fact, it sometimes contains the lives of more than one saint for the same day. For example, June 11 has both the translation of the body of St. Bartholomew of Armenia to Lipari and Benevento and another text, the *encomium* of St. Barnabas written by the monk Leontius. This vast collection of saints' lives was almost certainly copied in Constantinople, as shown by the emphatic presence of saints linked to Constantinople (Metrophanes, Alexander, Nicephorus, and Hilarion the New) and Hagia Sophia (the text written by Joseph *skeuphylax*), as well as some saints who bore witness to icon veneration in the period of iconoclasm, as did Hilarion the New (770–845) and Nicephorus I, Patriarch of Constantinople (ca. 758–828).

June 1	Justin martyr and his fellows (*BHG* 973)
June 2	Nicephorus I, Patriarch of Constantinople by Ignatius (*BHG* 1335)
June 3	Lucillianus martyr (*BHG* 998y)
June 4	Metrophanes and Alexander, bishops of Constantinople (*BHG* 1279)
June 5	Hilarion the New, Abbot of Dalmation by Sabas (*BHG* 2177)
June 6	Dorotheus martyr (*BHG* 565?)
June 7	Theodotus of Ancyra (*BHG* 1782a)
June 8	Theodorus stratelates martyr (*BHG* 1750)
June 9	Cyril of Alexandria
June 10	Timotheus of Prusia (*BHG* 2460)
June 11a	Translation of Apostle Bartholomew to Benevento and Lipari by Joseph, *skeuophylax* of Haghia Sophia (*BHG* 229)
June 11b	Apostle Barnabas by Leontius (*BHG* 226d)
June 12	Onuphrius
June 13	Aquilina martyr (*BHG* 163)
June 14	Elisaeus by Basil of Seleucia (*BHG* 582)
June 17	Hypatius of Bithynia (*BHG* 760)

Tab. 1: The contents of the recycled *menologion* in Vat. gr. 984 and Vat. gr. 1882 (June, first part)

[21] Vat. gr. 984 (its old number was 258) belonged to the group of codices (Vat. gr. 867–1142) which were put in chests in 1591 when the Vatican Library was transferred to its present building. Janz, Lo sviluppo dei vaticani greci, 512 and 530. Vat. gr. 1882 was assembled from 24 fragments in the 17th century. See the description by Canart, *Codices Vaticani Graeci*, 472–488.

[22] The minuscule script of the menologion reused in Vat. gr. 984 does not include infiltrated majuscule letters. Abbreviations are few. Accents are breathings and are accurate. Iota adscript is absent.

[23] See Ehrhard, *Überlieferung*, 650–654 with previous literature.

[24] Høgel, *Symeon Metaphrastes*, 51–59.

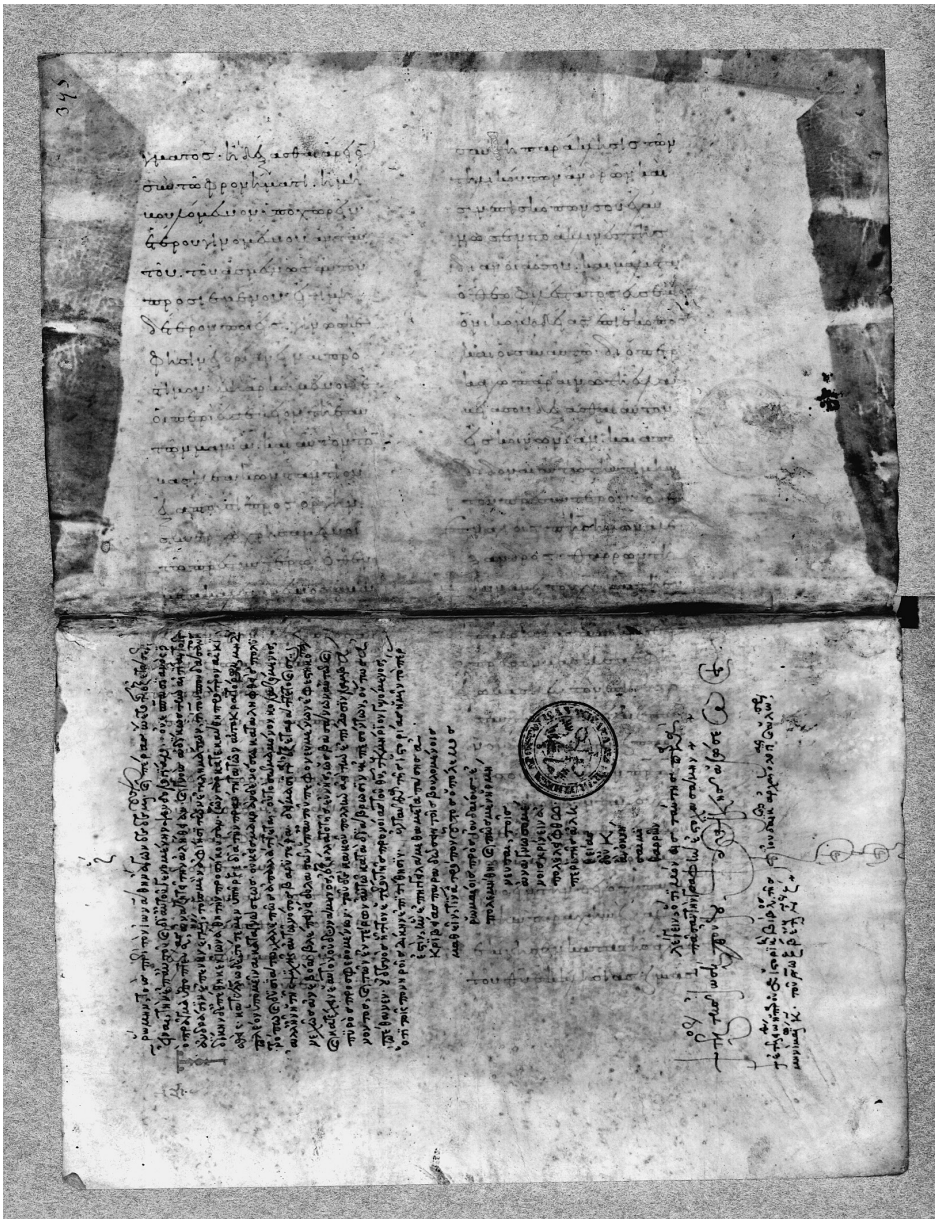

Fig. 1: Vat. gr. 984, ff. 344v+345r, rotated 90°:
Vita Metrophanis et Alexandri (*BHG* 1279), p. 179,6 (προστά>[column 1]γματος ἢ δέξασθαι Ἄρειον| σὺν τῶ φρονήματι. ἢ μὴ| ... οὔτε δὲ ἡ το>[column 2, 179,17]σαύτη παράκλησις| τῶν τηλικούτων ἀνδρῶν... [179,28] κατὰ τῆς ἁγίας| τοῦ Θεοῦ ἐκκλησίας· καὶ μιᾶς
(© Vatican Apostolic Library)

(2) Four bifolios remain from the other important palimpsest, which was recycled and rewritten twice.[25] The fragments of the oldest undertext contain a fragment of John Chrysostom's Homily on Pentecost, as well as a part of a homily on the Dormition of the Virgin Mary (15 August) written by Germanus I, Patriarch of Constantinople (ca. 634 – ca. 733). The other fragments, which are almost illegible, remain to be identified; they were probably part of a homiliary from the 9th century. The bifolios of this old codex were recycled for a medical text in the late 12th or early 13th century. In his medical text, entitled *De locis affectis*, Galen of Pergamon (129–216) describes a method that allowed the physician of antiquity to identify internal diseases that were not directly visible; the work thus represents a landmark in medicine. This informal cursive hand is a very early testimony of this work by Galen.

[25] Vat. gr. 984, ff. 162+157, 170+168 and Vat. gr. 1882, ff. 89+92, 90+91.

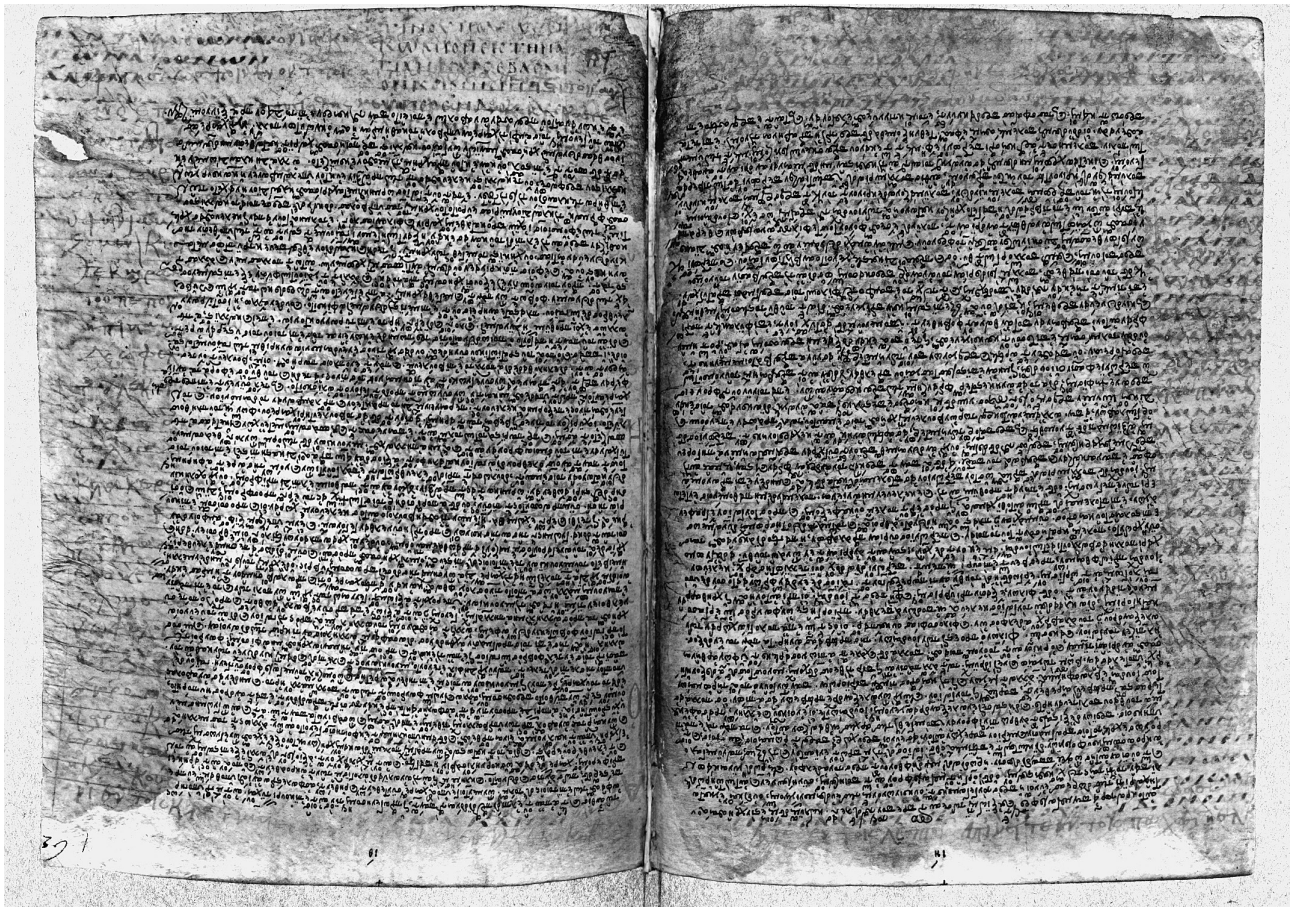

Fig. 2: Vat. gr. 984, ff. 162r+157v, rotated 180°:
Double palimpsest: Germanus, *Homily on the Dormition of Virgin Mary* (9th century, majuscule undertext) and Galen, *De locis affectis* (12th–13th century, minuscule undertext) under Flavius Josephus, *Jewish Antiquities* (1354, overtext)
(© Vatican Apostolic Library)

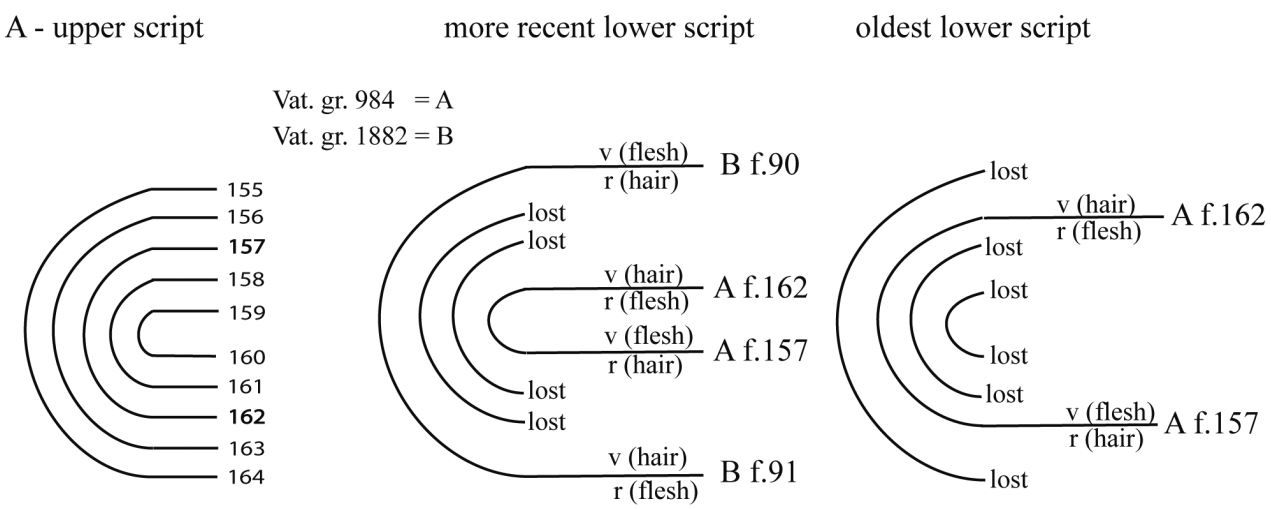

Fig. 3. *Membra disiecta*
The position of a bifolio (Vat. gr. 984, ff. 162r+157v) in three different manuscripts of the overtext and the two undertexts (cf. Fig. 2)

As we have seen, the recycled folios of these two ancient codices had multiple histories according to the individual manuscripts from which they derive. The scholarly narrative in *Spotlight* introduces each of these manuscripts with their overlapping stories in the section *Important Palimpsests*. *Mirador* viewer enables the reader to study each of these manuscripts separately. For example, one side of the bifolio 157v+162r (measuring 35 × 25 cm), which is a double palimpsest, is presented with annotations. This bifolio has three independent identities according to the three manuscripts it belonged to (*membra disiecta*) (Fig. 3). In the manuscript as it exists today, it contains sections from Flavius Josephus' *Jewish Antiquities*, B. 18–19 (upper script) from the 14th century, and makes the third and the eighth folio of a quinio, a gathering made up of five bifolios.[26] The more recent lower script (12th–13th century), which was copied in one column and ca. 35 lines per page, is legible if rotated in 180 degrees. It contains sections of Galen's work mentioned above and constituted the central bifolio of a quaternio, a gathering made up of four bifolios.[27] It is possible to reconstruct the precise position of the four surviving bifolios in this recycled manuscript (Fig. 3). The older undertext was probably a homiliary and it is legible in a few places in a position rotated in 180 degrees. It was copied in the 9th century in the Palestinian type of Sloping Ogival Majuscule and in two columns, measuring 6 (inner column) – 6.5 (outer column) × 21.5 cm each, in 40 lines per column. The title of the homily on the Dormition of Virgin Mary on f. 157v, which seems to exceed the written space in the upper margin, was written in Upright Ogival Majuscule.[28] I have not been able to identify the text on f. 157r and the lower part on f. 162r, column two, where Germanus' homily finishes and a new text begins, which continues on f. 162v. The most likely reconstruction seems to be that this bifolio made up the second and seventh folio of a quaternion, for two reasons.[29] First, the quantity of text missing between f. 157v and f. 162r supports this hypothesis. Second, the practice of mediaeval book production also supports it: a gathering normally begins with the flesh side of the parchment folio and its flesh side was followed by the flesh side and its hair side by the hair side. The annotation and the collation of the folios present in *Mirador* viewer encourage the reader to continue the process of decipherment on his or her own and make new discoveries.

THE RECYCLING OF THE PHILO MANUSCRIPT IN SOUTHERN ITALY

As we have seen before, the removal of unwanted or waste texts normally took place by washing rather than rubbing. Although some recipes survive,[30] we do not know exactly how it was carried out. The disbound parchment folios selected for reuse were normally already old objects and they had to be soaked for long enough to render the ink less visible and enable the parchment to host new texts. Such parchment sheets sometimes circulated separately in trade, and the reuse did not necessarily coincide with the place where the old discarded manuscript had been used.[31] However, it was perhaps more often the case that the old manuscripts were prepared for reuse in the scriptorium itself. In the process of the preparation of the parchment, small accidents sometimes happened. Vat. gr. 316 preserves an interesting piece of evidence of this.

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[26] Flavius Josephus, *Antiquitates Iudaicae* 18. 254–272; 19. 44–70 (ed. Niese), IV 186–189 and 218–223, (f. 157v) αὐτόκρατορ, εἶπεν,... ×... ταῦτ' ἐπράσσετο ἐπὶ (f. 162r) τῷ αὖθις καὶ τῇ ἀπ' αὐτοῦ ... ×... ἐπιτήδειον πράξει νομίζων.

[27] Galenus, *De locis affectis* (ed. Gärtner) *in media linea inc*. ἐπιστη>μονικήν p. 272,4, *expl*. κεκαῶσθαι 272,27, (f. 157v) *inc*. τὸ 272,27, *expl.* ἕλκωσις 274,22, (f. 157r) *inc*. οὐδέ>πω 274.22, *expl.* ἐκκρινομένων 276,16.

[28] Vat. gr. 984, ff. 162r+157v. *Encomium ad S. Mariam Deiparam a S. Germano archiepiscopo Constantinopolitano scriptum* (*BHG* 1119) in *PG* 98, coll. 340–348. (f. 162r, column 2): <Τοῦ ἐν ἁγίοις Πατρὸς ἡμῶν Γερμανοῦ ἀρχιεπισκόπου Κωνσταν>τινουπόλεως ἐγ|κώμιον εἰς τὴν ἁ|γίαν καὶ σεβάσμι|ον κοίμησιν τῆς| ὑπερενδ<όξ>ου ε<ὐ>|λογημένης Δεσποί|νης ἡμῶν Θεοτό|κου καὶ ἀειπαρθέ|νου Μαρίας… × (f. 157v, column 1) μεθ' οὗ καὶ σὺ συ<ν>|διάγωγος οὖσα |Θεοτόκε οὐκ ἀ|ποχωρίζη τ<ῆς>…

[29] The alternative option is that it was the second and ninth folio of a quinio. However, early codices more often consisted of quaternios. The quantity of the missing text is difficult to assess but it seems to have occupied at least four folios, i.e. two bifolios.

[30] Reed, *Ancient Skins and Leathers*, 156–157.

[31] Tchernetska and Wilson, The palimpsest in context, 260 and 265 fn. 88.

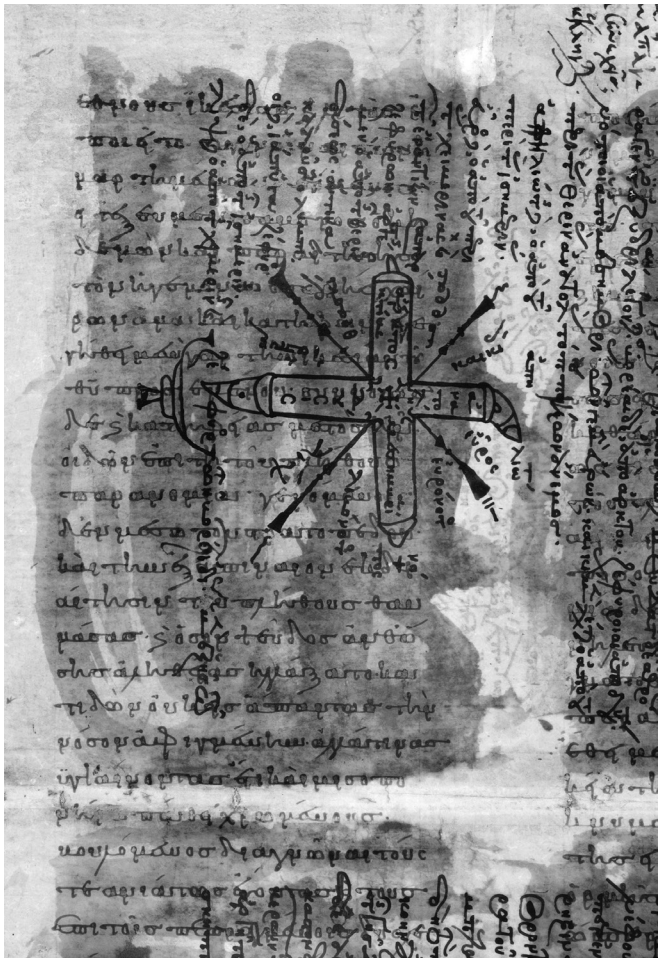

Fig. 4: Vat. gr. 316, f. 152v, rotated -90°, undertext (horizontal):
Philo, *De vita Mosis II*, 166–167 (ἔθνους ἱκεσίας… ἐπὶ τοῖς πεπραγμένοις δυσχε<ραίνοντας>, ed. Cohn, 238–239)
(© Vatican Apostolic Library)

Vat. gr. 316 contains various works of John Italus (11th century), a Byzantine Neoplatonic philosopher of Calabrian origin who later made his career in Constantinople.[32] Based on the characteristics of the writing style (*minuscola barocca*), this collection of puzzling philosophical questions and their solutions was copied in Salento (South Italy) in the early 13th century, together with another manuscript with almost identical contents.[33] The anonymous scribe recycled one codex into the new one in both cases.[34] The entire codex body of Vat. gr. 316 was copied on folded parchment sheets. All parchment folios of the codex body derive from a massive late 9th–early 10th-century codex which contained a full edition of Philo of Alexandria (ca. 20 BC – ca. 45 AD) (Vat. gr. 316, *inf.* 2), as the numbers next to the titles of each work demonstrate.[35] In the surviving fragments of Philo's works (*De vita Mosis*, *De decalogo*, *De specialibus legibus* I–II, *De migratione Abrahami*, *De Iosepho*), two hands can be distinguished.[36] Both used a very pure and elegant minuscule script from the late 9th or early 10th century. Majuscule letters do not infiltrate the script, accents and breathings are careful and systematic, iota adscript is not used. Philo's text was arranged elegantly in two columns (ruling type: 00C2),

[32] On Vat. gr. 316, see Mercati, *Codices Vaticani graeci*, I, 467–474. Arnesano, Aristotele in Terra d'Otranto, 153–155 with earlier literature. The most important studies on Philo's palimpsest are by Cohn, Ein Philo Palimpsest (on the script see 37–38); Mercati, Appunti dal palinsesto.

[33] On Vat. gr. 316, see above n. 32. The other manuscript is Marc. gr. 265 (*Diktyon* 69736). See its description by Formentin, I palinsesti greci, 160–162.

[34] The undertext of Marc. gr. 265 contains the homilies of Gregory of Nazianzus in minuscule script. *ibid*.

[35] Mercati, Appunti dal palinsesto, 489–493.

[36] Scribe one (Vat. gr. 316, ff. 94–101) and scribe two (all the rest).

measuring 7–7.5 × 25 cm each, with large margin (outer margin: 6.5–7 cm, inner margin: 2.5 cm), 35 lines in each column. As far as the quality of the text is concerned, the discarded works of Philo are very important, and constitute the earliest surviving witness to all the texts it contains.[37] The quality of the script, the parchment, and the text all lead to the conclusion that the recycled Philo codex was copied in Constantinople. The protective flyleaves of Vat. gr. 316 seem to be contemporary to the overtext of the codex body, and are also a palimpsest. The parchment bifolio that was added to the front of the codex (ff. III–IV) contains a letter of George Bardanes, the Metropolitan of Corfu, to Emperor Frederic II (1194–1250).[38] It seem that the scribe did not make much effort to remove the old text, but copied the new one right on top of it and produced something which is, strictly speaking, not a palimpsest but a rewritten (*rescriptus*) bifolio. At the end of the codex, another letter (f. 167) was inserted as a flyleaf, containing the story of a refugee from Calabria to the Greeks.[39] Interestingly enough, the text of one side was not removed and not rewritten (f. 167r) unlike the other side (f. 167v). Nevertheless, we can consider these two letters as testimonies for double recycling. Both were first recycled in the 13th century when the overtexts were copied onto parchment sheets that derive from a 10th-century manuscript that contains passages from the Old Testament.[40] Their second recycling served a protective purpose, probably when the manuscript was first bound in South Italy.

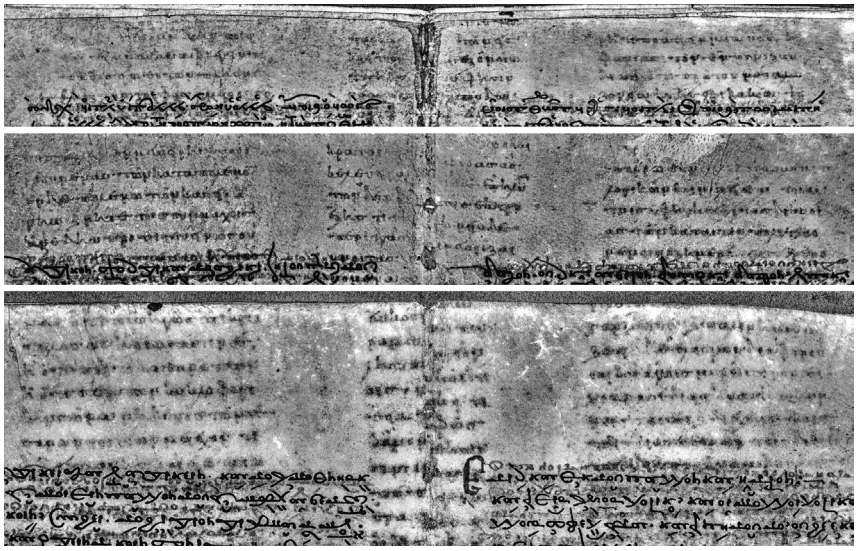

Fig. 5: The offset scripts in Vat. gr. 316 on the lower margins with 180° rotation (Top image: ff. 101v+94r, middle image: ff. 95v+100r, bottom image: ff. 96r+99v). Cf. transcriptions on Table 2 (© Vatican Apostolic Library)

In addition to recycling, Vat. gr. 316 offers a very illustrative case study of various methods used to facilitate the reading of the discarded texts. Angelo Mai used gallic acid to revitalize the faded lower script of Philo's texts—very often with success. We can see from the traces of Mai's intervention that the manuscript remained bound during his chemical intervention. In 1904, Vat. gr. 316 was disbound. Its bifolios were cleaned and treated with gelatine in many places to stabilize the condition of the manuscript, which had suffered damage from Mai's intervention. Eventually, the open bifolios of Vat. gr. 316, each comprising a folio of the recycled Philo manuscript (37.2 × 27.1 cm), were rebound following the sequence of the quires of the overtext, resulting in a disturbed textual order both for the overtext and undertexts.[41] The purpose of rebinding Vat. gr. 316 was mostly to facilitate the study of Philo's texts, especially in the folding where textual sections remained covered by the former binding but free of the effects of Mai's reagents. Today, the visualization option of *Mirador* viewer can help in reading both the overtext and the undertext according to the correct order of each. The correct order of the undertext, as in many cases, is included in the description of the contents of the undertexts. The collation of the actual manuscript also helps the reader.

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[37] Cohn, Ein Philo Palimpsest, 36–52; Id., Prolegomena, in: *Philonis Alexandrini*, v–vii; Mercati, Appunti dal palinsesto, 541–555.

[38] Acconcia Longo, Per la storia di Corfù, 210, 213–219, 224.

[39] Quaranta, Un'inedita fuga a Bisanzio.

[40] Vat. gr. 316, ff. IVr–v, IIIr–v: Amos 9, 11 (αἱ) - 15; Mic 1, 1–3, 11 (αὐτῆς); (f. 167r–v): Ezek 22, 22 (μέσω) – 23, 12 (στρατη<γοὺς>).

[41] On the date of rebinding of Vat. gr. 316, see Mercati, Appunti dal palinsesto, 544 fn. 2.

f. 101v (rotation 180°), offset, 1st column	f. 101v (rotation 180°), offset, 2nd column	f. 94r offset (rotation 180°), 1st column	f. 94r (rotation 180°), offset, 2nd column
Philo, *De virtutibus* 163, ed. Wendland, 317	Philo, *De virtutibus* 165, ed. Wendland, 318	Philo, *De virtutibus* 168, ed. Cohn, 319	Philo, *De virtutibus* 171–172, ed. Cohn, 320
<ποιεῖται> τῶν μὲν ἀναφλέγειν τὸ πάθος εἰωθότων, πλησμο<νῆς>	<illegible> <illegible> ψυχὴ <δὲ εὐχάριστος> <illegible>	<μηδὲν παραλιπόντα> τῶν εἰς <τὴν ἐνδεχομένη>ν ἐξομοίω- <σιν. ἐπειδὴ τοίνυ>ν, φησίν, <ἔλαβες ἰσχὺν παρὰ> τοῦ δυν- <ατωτάτου, μετάδος> ἄλλοις	… ὃς ἂν ἐγχει- ρῇ τι πράττειν μεθ’ ὑπερη- φανίας, “τὸν θεὸν παροξύνει” [172] διὰ τί; ὅτι πρῶτον μὲν ἀλα- ζονεία ψυχῆς ἐστι κακία, …

f. 95v (rotation 180°), offset, 1st column	f. 95v(rotation 180°), offset, 2nd column	f. 100r (rotation 180°), offset, 1st column	f. 100r (rotation 180°), offset, 2nd column
Philo, *De virtutibus* 153, ed. Cohn, 314	Philo, *De virtutibus* 155–156, ed. Cohn, 315	Philo, *De virtutibus* 157–158, ed. Cohn, 315	Philo, *De virtutibus* 160–161, ed. Cohn, 316
καὶ τὰς πόλεις, ἐν μὲν εἰρήνῃ προ- νοουμένας τῶν κατὰ πόλεμον, ἐν δὲ πολέμῳ τῶν κατ᾽ εἰρή- νην, καὶ μήτε τοῖς συμμάχοις ἀνέδην προπιστεύειν ὡς οὐ	…κραται<οτέραν δύναμιν.> [156] κελεύει γὰρ <τὰ νεόφυτα> τῶν δένδρ<ῶν ἐπὶ τριετίαν> ἐξῆς τιθη<νεῖσθαι τάς τε> περιττὰς <ἐπιφύσεις…>	<πρὸ καιροῦ πονηθῆναι> φοραῖς, ἃς <αἱ πάλαι κληματί>δες ἐπηχθ- <ισμέναι ῥίζαις αὐτ>αῖς ἐκτρύ- <χουσι τὰ στελέ>χη. [158] μετὰ δὲ <τριετίαν, ὅταν αἱ μὲν> ῥίζαι	πόρρωθεν <ἀναδιδάσκεται> λογικῶν ἐπιμελεῖσθαι. [161] τοιαύ- ταις ὑφηγήσεσι τὰς διανοί- ας τῶν κατ᾽ αὐτὸν πολιτευο- μένων ἐξημερώσας <ὑπεροψίας.>

f. 96r (rotation 180°), offset, 1st column	f. 96r (rotation 180°), offset, 2nd column	f. 99v (rotation 180°), offset, 1st column	f. 99v (rotation 180°), offset, 2nd column
Philo, *De somnis* 1.21, ed. Wendland, 194	Philo, *De somniis* 1.23, ed. Wendland, 194–195	Philo, *De somniis* 1.26–27, ed. Wendland, 195	Philo, *De somniis* 1. 28.3, ed. Wendland, 196
<εἴποιμεν>; ὅτι πεπηγώς ἐστι κρύ- σταλλος, ὡς ἠξίωσάν τινες; ἢ ὅτι πῦρ τὸ καθαρώτατον; ἢ ὅτι πέμπτον κυκλοφορι- κὸν σῶμα, μηδενὸς τῶν τεσ- σάρων στοιχείων μετέχον; τί δ’; …	ἐν κόσ<μῳ σώματος ὄντα, οὐ-> ρανοῦ, <ἄδηλα καὶ ἀκατά-> ληπτα, <στοχασμοῖς καὶ εἰκασί-> αις, οὐ <παγίῳ λόγῳ τῆς ἀληθείας,> <ἐφορμοῦντα· ὥστε > κἂν ὁμ<όσαι τινὰ θαρρή-> σαντα, <ὅτι θνητὸς οὐδεὶς> πώποτε <ἰσχύσει τούτων> ἐναρ<γῶς …>	<… γηράσ>κει, τε- <λευτᾷ, [27] διαλύεται, σα>φῶς <ἴσμεν…>	ἀνάρμοστος, καὶ πάλιν ἡ μὲν μεί- ζων, ἡ δὲ ἐλάττων· διαφέρου- σαι καὶ ἄλλοις μυρίοις, γένεσι, χρώμασι, <διαστήμασι, συνημμέναις…>

Tab. 2: Transcriptions of the offset scripts in Vat. gr. 316 (cf. Fig. 5)

Vat. gr. 316 also offers a riddle which has not so far been solved. In the detailed description of Vat. gr. 316, Giovanni Mercati and Franco de' Cavalieri noted that three bifolios of Vat. gr. 316 were double palimpsests and included an older and illegible layer under Philo's work which had been erased in the 13th century to make space for the work of John Italus.[42] Actually, this phenomenon is present in the entire quire ff. 94–101, which has fragments from the portion of the manuscript which preceded quires 37–46 and was copied by a similar but not identical hand. (The fact that all materials of a consecutive portion of a manuscript—in this case quires 37–46—are reused in another manuscript, namely in Vat. gr. 316, is a very rare case in palimpsests.) When studying these pages, I discovered that the third layer of minuscule texts which can be seen in three columns perpendicular to Philo's text are legible in offset. It is very difficult to read and identify these texts because the form of the letters is not sharp and only a few places allow precise textual identifications. I was able to identify fragments from Philo's three works (*De somniis*, *De mutatione nominum* and *De virtutibus*, cf. Tab. 2).[43] The few lines in the upper margins which allowed themselves to be identified seem to have been written by the same hand as the one which copied Philo's washed text on these four bifolios, and derive from the first—now lost—part of the original Philo codex. As it follows after the bifolio ff. 101v+94r, *De mutatione nominum* was followed by *De virtutibus*. After the process of washing the parchment writing surface—in my view,—the bifolios were left to dry on a horizontal surface, probably a table or a desk. The scribe of John Italus' texts apparently put the already-folded parchment sheets which had been recycled from the Philo codex right on the top of the open—and probably still wet—bifolios. One of the two writing surfaces (that of John Italus' text or that of Philo's underlying texts) was wet. The fact that the upper script is very stable makes it more a plausible hypothesis that the underlying writing surface was wet, since it is very difficult to copy onto wet parchment. Perhaps a liquid poured onto this surface or the cold and humid weather prevented the treated parchment sheets from drying as fast as the scribe expected. The disturbance of the unwanted transfer of ink did not compel the scribe to change the rhythm of copying in this quire. However, other quires of the same codex do not exhibit this phenomenon, although the scribe of the overtext is the same. As we have seen from the sophisticated contents and the very elegant script, the Philo codex came probably from Constantinople, but it may have arrived in Salento much earlier than the production of the actual manuscript as well. This discovery inspired the Stanford IT group to include the option of mirroring the current image as one of the image enhancement tools. This function will enable readers of the digitized Vatican manuscripts to read analogous phenomena.[44]

CONCLUSIONS

The pathway *Vatican Palimpsests: Digital Recovery of Erased Identities* makes manuscripts with recycled parchment surface more easily accessible to a wider readership. I hope that the scholarly narratives on palimpsests and the case studies presented in *Mirador* viewer will encourage deeper study of palimpsests in the Vatican Library and elsewhere. The online interaction between the reader and the images of manuscripts may produce other sets of interactions: dialogues between scholars of different backgrounds, and collaborative projects in which participants combine their expertise, as we have seen in the exemplary collaboration between scholars and IT experts in the Sinai Palimpsests Project.

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[42] Mercati, *Codices Vaticani graeci*, I, 474: 'ff. 94r, 101v, 95v, 100r, 96r, 99v iam paullo ante scripta fuerunt tribus columellis scripturae perpendiculatis: quid vero scriptum sit non adsequor.'

[43] The offset of an illegible one column Greek text in the bottom margin of Vat. gr. 316, f. 97v may derive from another codex.

[44] See, for example, the offset imprint of the ink from the lost fragment that had served as the earlier pastedown on the inside of the lower board of the previous binding in Vat. lat. 1116, f. 297v.

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