

‘The Graz Mummy Book’ (UBG Ms I 1946)

Impressions from an Experts’ Meeting

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ABSTRACT

This paper summarizes the main arguments discussed at a meeting held at Graz University Library, Austria, in February 2024 where a team of experts met to discuss papyrus fragment UBG Ms I 1946, also known as ‘The Graz Mummy Book’. This fragment, which had been recycled as mummy cartonnage in the Ptolemaic period, displays features of a bifolio with a central fold and text written on either side. It also has holes and a thread fragment which indicate that the document was folded upon itself and secured with tackets. Another pair of holes, named X and Y, is positioned at equal distance from the central fold and was pierced from the opposite direction to the tacket holes. Along with the bifolio features, the Graz team interpreted these holes

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1. The core team from Graz University Library, Austria—Theresa Zammit Lupi, Lena Krämer, Erich Renhart, and Thomas Csanády—has been closely involved in the investigation of Ms I 1946 since its discovery. Manfred Mayer, former head of conservation at Graz University Library, Georgios Boudalis (Museum of Byzantine Culture in Thessaloniki, Greece), and Nicholas Pickwood (University of the Arts, London) contributed their expertise in book history, and Helen Sharp (British Museum) was asked to join the team as a specialist in the materiality of papyrus; all also offered perspectives as conservators. Brent Nongbri (MF Norwegian School of Theology, Religion, and Society, Oslo) contributed his expertise in the early history of the book and his knowledge of papyrology, and Jill Unkel contributed as a specialist in ancient history and through her familiarity with the early papyrus codices at the Chester Beatty, where she is curator of Western Collections. Jörg Feldmann (University of Graz, Austria) was asked to join the February 2024 meeting to represent the natural sciences and contribute his analytical approach.

as evidence for a stab sewing, which would make the fragment the earliest surviving remains of a codex, predating other known examples by at least four hundred years. Because this interpretation was contested, the meeting in Graz was convened to facilitate open discussion about the nature of the fragment. The meeting focused on examining the individual features of the document, with particular attention to the holes, and their possible interpretations. Gaps in the understanding of Ptolemaic cartonnage-making practices were identified and scientific analysis and comparison were suggested as methods for further investigation of the fragment.

Introduction

UBG Ms I 1946 IS A PAPYRUS FRAGMENT DATING FROM AROUND 260 BCE. It had been recycled as mummy cartonnage and was excavated in the early twentieth century from the archaeological site of El Hibeh in Egypt by B. P. Grenfell and A. S. Hunt on behalf of the London-based Egypt Exploration Fund.² The University of Graz received the fragment as a part of the Fund's distribution programme.³ In May 2023, during routine conservation work on papyrus fragments in the Graz collection, Theresa Zammit Lupi noticed that the fragment displays several features normally associated with a bifolio of a codex (a central fold, apparent margins, holes possibly associated with a binding) (see Fig. 1, below). These features led to the interpretation of the object as a fragment of a codex-like structure. If this were the case, this would make it the earliest surviving codex fragment, predating any existing example by at least four hundred years. As the document resembled a bifolio and had at one point been used as mummy cartonnage (see Fig. 2, below), Graz University Library nicknamed it 'The Graz Mummy Book' and publicized the find.

This announcement led to a variety of different reactions. It quickly became clear that the summary provided to the press could easily be misunderstood, especially without access to the original fragment. Because of this, Zammit Lupi, together with Lena Krämer, Thomas Csanády and Erich Renhart, produced a detailed paper describing the fragment under the title "Observations on 'The Graz Mummy Book'" for public distribution in September 2023.⁴ This paper is divided into two parts: the first is an objective description of the fragment's features, and the second explains

2. The fragment was published as P.Hib.113: see GRENFELL AND HUNT 1906, 303–05. It is found in Trismegistos as TM 8242.

3. See MAZZA 2015, 113–42.

4. See ZAMMIT LUPI, KRÄMER, CSANÁDY AND RENHART 2023; see also ZAMMIT LUPI, KRÄMER, CSANÁDY AND RENHART 2024.



Figure 1. Recto of UBG Ms I 1946 with pierced holes labelled. The fragment measures approximately 150 x 250 mm.



Figure 2. Verso of UBG Ms I 1946 with pierced holes labelled.

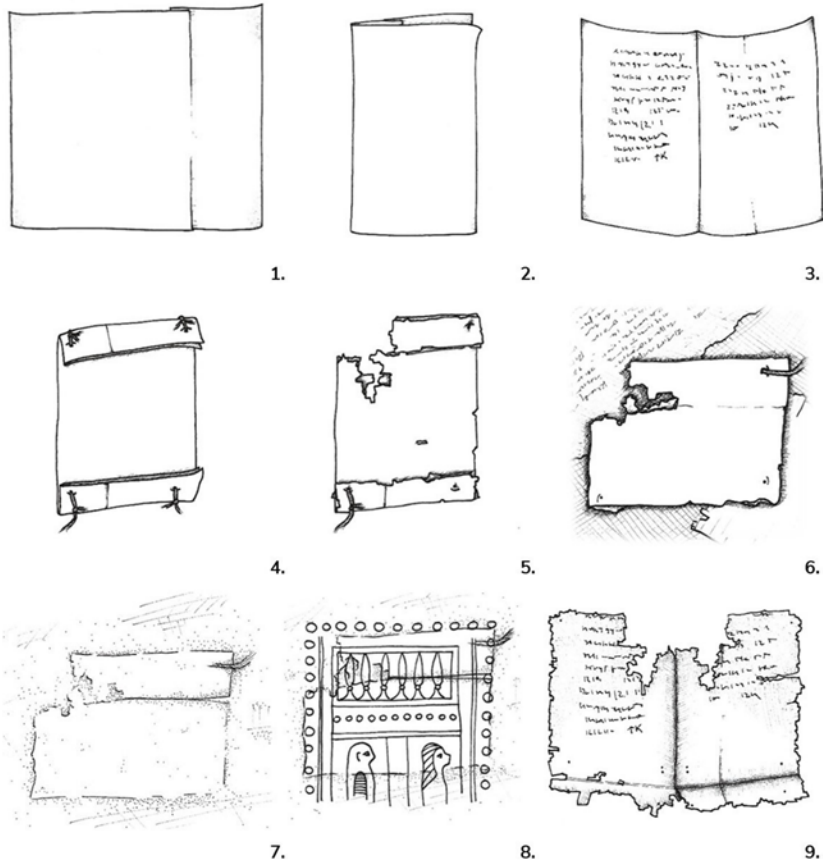


Figure 3. The reconstructed chronology of UBG Ms I 1946 as updated after the meeting: 1. A blank papyrus sheet (formed of two kollemata joined by a kollesis); 2. The piece is folded to form a bifolio; 3. The inside of the bifolio is written upon; 4. The edges of the bifolio are folded over and secured with tackets; 5. Significant damage occurs; 6. The bifolio is reused as mummy cartonnage alongside further papyrus waste and/or textile; 7. The cartonnage surface is plastered; 8. The cartonnage is painted; 9. The bifolio is taken from the mummy and becomes a museum object. The contentious part of UBG Ms I 1946 is whether there were some additional steps directly before or after writing in step 3, in which holes X and Y were created (see Fig. 7, below).

their interpretation. Despite subsequent revisions to the interpretation, this paper still forms the basis of what we know about the fragment today. Therefore, it is recommended that readers familiarize themselves with it before attempting to understand the following.

Because of the need to clarify many aspects of the fragment's history, a group of experts was invited to Graz University Library on February 12–13, 2024. The aim was to bring together specialists from various disciplines with different mindsets and approaches. The scholars included papyrologists, codicologists, historians of ancient history, conservators, and chemists.

The meeting began with the participants presenting their respective viewpoints and interpretations based on the aforementioned publication. The remaining time was spent examining the fragment under the microscope (Leica M80), experimenting with models, and discussing important features of the fragment. By the end of the meeting, some points of consensus had emerged, and the participants agreed to co-author this paper to share their results.

The main part of this paper summarizes the issues discussed during the meeting and the conclusions that were reached by the participants.⁵ It follows the different stages of the fragment's history as illustrated in Figure 3 (above). The most contentious point was the possibility of the fragment having been temporarily stored in what the Graz team had originally described as a notebook or codex-like structure. The questions around the origins of the holes on which this theory is based will be discussed. This section is followed by an overview of questions that still remain open, ideas for analysis and further research that arose during the meeting, and comparative material that the group considered. The paper concludes with an argument for re-examining objects in papyrus collections in the search for material comparable to UBG Ms I 1946, and the uniqueness of the fragment itself.

Bifolio

There was an almost general consensus that the fragment was designed as a bifolio from the outset.⁶ This interpretation is supported by the neatness

5. The authors are grateful for Prof. Bernhard Palme and Dr Mark de Kreij's critical contributions to the February meeting, and would like to thank Dr Pia Fiedler and Tina Podrepsek for their assistance in documenting the meeting in preparation for this publication.

6. By "bifolio" we mean simply that the papyrus sheet was intentionally folded down the middle.

and accuracy of the central fold⁷ and the symmetrical arrangement of the writing between clearly defined margins⁸. A central fold would have assisted the scribe with the layout of the written columns. The document was written in a highly practiced hand in a well-established commercial and administrative environment, indicating that there was nothing casual or accidental about its production. These are all signs that the sheet was folded in the middle before the two pages of continuous text were written.

It was pointed out that the wetting processes required to turn the fragment into cartonnage (and later to retrieve the papyrus document) may have obscured some of the information originally present in the fragment. Because of these interventive processes, the possibility cannot at present be excluded that the fragment was cut from a roll of accounts and only folded into its current shape during the cartonnage-making process. However, the appearance of the text layout and the exact location of the fold suggest that they were made consciously rather than accidentally.

Text

Although the focus of this meeting was on the materiality of the fragment, there was also progress in deciphering the content. Thanks to the multispectral images provided (see Fig. 4, below), two of the participants were able to identify the fragment as a self-contained document that is a list of expenses with a fiscal content, namely challenged outstanding payments. As far as the authors are aware, this kind of document is unparalleled. Now that this medial innovation has been identified, it will be imperative to study the related evidence to gain a better understanding of developments in writing technology in the early Ptolemaic period.

7. See 2. Central Fold in ZAMMIT LUPI, KRÄMER, CSANÁDY, AND RENHART 2023, 3; 8–9.

8. See 3. Recto in ZAMMIT LUPI, KRÄMER, CSANÁDY, AND RENHART 2023, 3–4; 10–11.

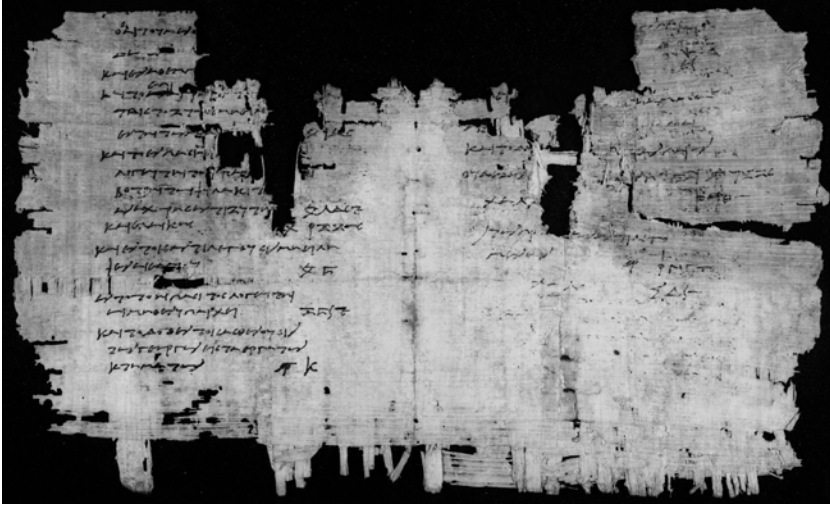


Figure 4. Enhanced multispectral image of UBG Ms I 1946. Photo credit: Karl Lenger.

Tacketed document

The examination of the horizontal folds confirmed the theory that these were made to seal the self-contained document with thread tacketts in order to protect the presumably sensitive contents from unauthorized access.⁹ The evidence for this is seen in the fold patterns (which are very clear using raking light), the presence and position of the thread, the piercing direction, and the grouping of the holes (A to J) in various pairs or sets.¹⁰ Though none of the authors are aware of any parallels for Ptolemaic accounts produced on a bifolio that was subsequently sealed and tacketed in this manner, it was agreed by most that this is a good explanation of the physical remains. With this newly-observed feature in document sealing, it is hoped that comparable material will emerge from other collections.

One alternative interpretation attributed the folding and tacketing to the cartonnage-making process. There is no shortage of surviving cartonnage panels that have holes for attaching the panels to the mummy. However,

9. See 5. Horizontal Fold(s) in ZAMMIT LUPI, KRÄMER, CSANÁDY, AND RENHART 2023, 4; 12–13.

10. See 6. Holes in ZAMMIT LUPI, KRÄMER, CSANÁDY, AND RENHART 2023, 4–6; 13–16. See also the images provided on <https://mummybook.uni-graz.at/en/>, in particular https://static.uni-graz.at/fileadmin/_files/_project_sites/_mummybook/Files/Pierced_holes_-_detail_images_and_pricking_direction.pdf.

the appearance and size of these holes are very different from those on UBG Ms I 1946. It is also significant that the surviving thread in UBG Ms I 1946 is embedded in the plaster and pigment, indicating that the thread, and therefore also the holes, were already in place before the cartonnage was plastered. At the meeting, there was a general agreement on the holes predating the cartonnage production process and stemming from the fragment's prior use as a document.

The questions regarding holes X and Y

One pair of holes in the papyrus has a very different appearance from the holes used for tacketing the document. This is the pair we have referred to as X and Y (see Figs. 1 and 2, above; see Fig. 5, below).¹¹ While the holes used for tacketing come in groups which were all pierced at once through the folded layers and are therefore positioned at equal distances and symmetrically relative to the folds, X and Y stand alone as a pair and do not line up with any other holes. The piercing direction of X and Y also appears to be opposite to all the tacketing holes (see the reconstruction of the piercing in Fig. 6, below). The horizontal papyrus fibres on the recto around holes X and Y are distorted: they look like they were pulled downwards by the mechanical action of piercing.

During the meeting, the possible origins for holes X and Y were thoroughly discussed. Originally, the Graz team had interpreted these holes as evidence for a stab sewing. This interpretation had been contested without a plausible explanation for the presence of holes X and Y being offered, which was one of the major reasons for holding the meeting. If the origin of holes X and Y is not accidental, then it may be explained by assuming the document was at one point stored together with others.

It should be emphasized that the fragment is a self-contained document. This means that, if it was stored with other documents, their contents may have been unrelated, favoring the argument of a *temporary* binding or attachment structure, such as a temporary stab sewing or spiking method as illustrated in Figure 7 and described below. We cannot exclude the possibility that X and Y may have a different origin, such as having been accidentally created in the process of tacketing the document. Although we cannot be certain about their interpretation, their existence is crucial in understanding the fragment, and so X and Y do need to be considered carefully.

11. See also Figure 11 in ZAMMIT LUPI, KRÄMER, CSANÁDY, AND RENHART 2023, 13.

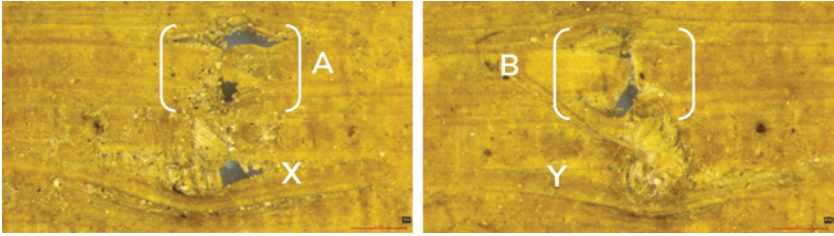


Figure 5. Holes A, X, B and Y as seen on the recto of UBG Ms I 1946.

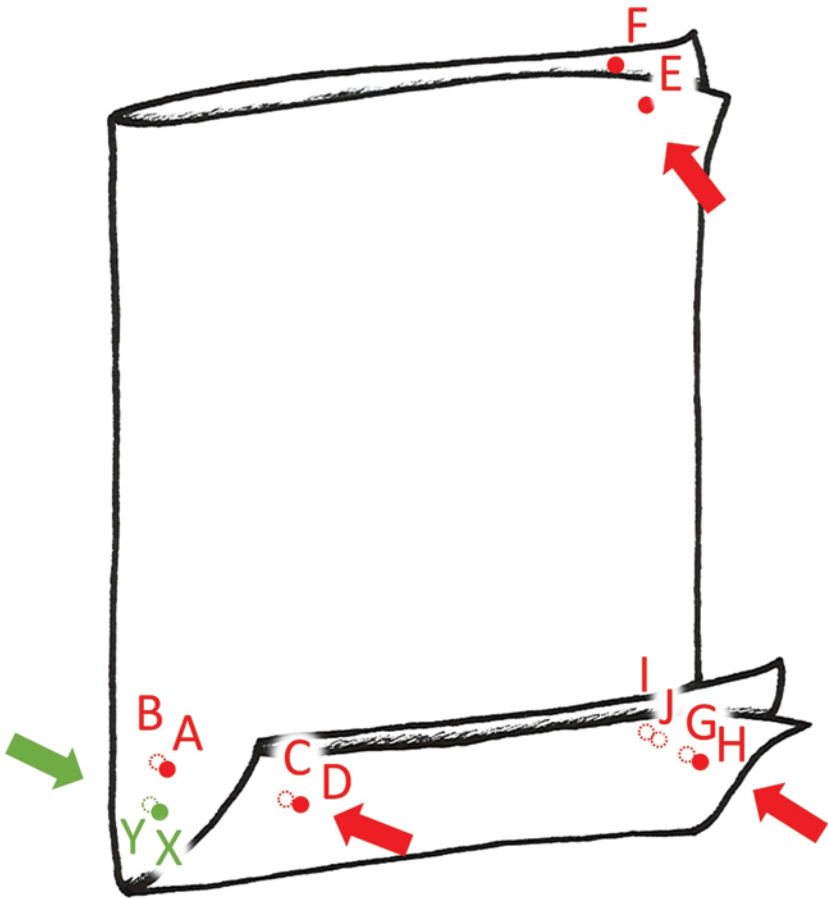


Figure 6. Direction of pricking of the hole sets A/B/C/D, E/F, G/H/I/J shown in red and X/Y shown in green.

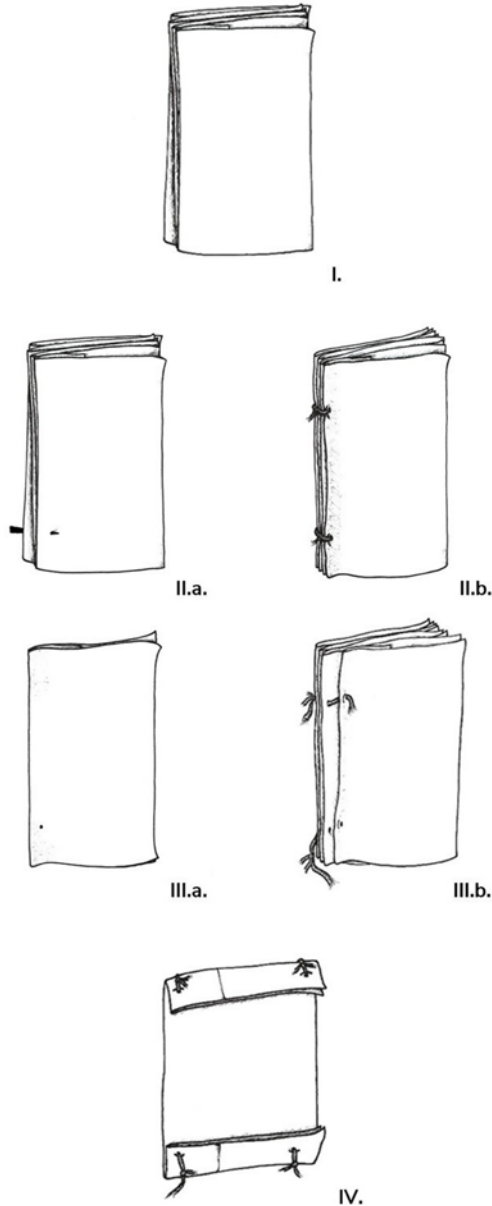


Figure 7. Possible explanations for holes X and Y on UBG Ms I 1946: I. Multiple documents are stored together; II. The documents are temporarily attached to each other by spiking (a.) or with a stab sewing (b.); III. UBG Ms I 1946 is removed; IV. The edges are folded over and sealed with tackets. Steps I to III could have occurred either before or after the text was written (image 3 in Fig. 3).

Stab sewing: For a stab-sewn structure to function properly, at least one additional pair of holes would be required in the upper part of the bifolio. However, owing to damage in that portion of the papyrus, it is impossible to know whether the missing part of the fragment contained another such pair of holes. The pale appearance of the papyrus around the central fold, which was taken as evidence for a stab sewing by the Graz team, seemed inconclusive to the group. Thus, the stab-sewing theory has come to rest solely on the existence of holes X and Y. Therefore, it is a point of contention. Another argument against a stab-sewn structure is the relatively short period between the estimated date at which the document was written and the date of the cartonnage from which it was extracted. So, although the possibility of a stab sewing cannot yet be excluded altogether, it seems to be a less likely explanation.

Spiking: A more promising explanation for holes X and Y is the use of spiking, which refers to a method of temporarily storing together sheets or documents using a spike or hook. This theory is particularly compelling given the direction of piercing, as placing the bifolio onto a spike from above would result in the spike entering from the back and emerging from the front. If we were to imagine the scribal workshop responsible for producing the fragment, there are two scenarios that might explain the use of spiking: one in which clean, possibly pre-folded bifolia were gathered on a spike for ease of access, and another in which the completed documents were temporarily spiked for storage until they were checked or collected and, in the case of UBG Ms I 1946, sealed.

Open Questions

A series of issues which arose during the meeting remains unanswered. One of the main questions raised by the authors concerned the exact process by which cartonnage was made in the Ptolemaic period. Although some studies in this area have appeared in recent years, much uncertainty remains.¹² So far, the authors have not been able to find any relevant detailed information on the manufacturing techniques of cartonnage in the Ptolemaic period. Similarly, while we do have some descriptions of methods used for retrieving papyrus fragments from mummy cartonnage in institutional settings, this process is not

12. VANDENBEUSCH, O'FLYNN, AND MORENO 2021, and MÜLLER AND DERBALA 2023.

documented in Grenfell and Hunt's notes on this particular fragment.¹³ Because of this absence of evidence, it is impossible to know what changes the fragment underwent between being applied to the mummy and reaching its current condition. Understanding the degree and way in which important features were altered — and by whom — would add greatly to the interpretation of the fragment.¹⁴ So far, this is a matter of speculation — and this is where the opinions about the interpretation of the fragment drift apart.

An improved knowledge of the cartonnage-making process would also benefit our understanding of the questions relating to the ink transfer visible on either side of the bifolio, especially with multispectral imaging.¹⁵ Some of the authors believe that this ink transfer occurred immediately after writing, specifically when the bifolio was closed while the ink was still fresh. Others contest this idea by arguing that the difference in drying time between the text on the left and the right side should have caused a more irregular transfer on both sides. The even appearance of the ink transfer may also indicate that it occurred when the sheet was wetted during the processes of making or dismantling the cartonnage, as might be expected from examples of ink transfer in cases where one surface was adhered to another. The participants did not reach consensus on this issue.

Analyses and further research

Some participants proposed experimentation using modern materials to test possible outcomes of different processes: reproducing holes with needles and awls, testing methods for cartonnage construction and dismantling, and testing for ink transfer through dampening. Others questioned how reliable analogies from the behavior of modern commercial papyrus can be. Modern commercial papyrus is not produced with the same methods and in the same quality as it was in antiquity, so it may not provide a sufficiently close analogue to the material used

13. See FRÖSEN 2009, 87–90.

14. For instance, consider the folds in the fragment. It is unclear how much data exists for determining how common it was to fold used papyri before putting them to use in the construction of cartonnage.

15. See 2c in ZAMMIT LUPI, KRÄMER, CSANÁDY, AND RENHART 2023, 9–10.

by the scribe of UBG Ms I 1946.¹⁶ We also lack exact knowledge of ancient inks. Even if the recipe could be reproduced exactly, there are many variables in the application and ageing conditions, making it impossible to replicate the features of writing and ink transfer with modern materials. Keeping in mind these caveats, we plan to conduct some experimental research. This will mostly focus on understanding the mechanics of perforation by creating holes in modern papyrus and other materials with different tools, angles of puncture, and sheet and fibre arrangements. These samples will then be examined under magnification to compare how the fibres react to these processes and how they correspond to the holes in UBG Ms I 1946.

There was greater agreement among the group that scientific analyses should be carried out. The holes X and Y and A to J need to be observed under microscopy to help distinguish manmade holes pierced with needles or awls from insect damage. Similarly, 3D scanning should provide better visualization of the holes and may reveal further details that have so far been invisible. Raman spectroscopy and FTIR will be carried out to record the topography and elemental distribution of the fragment. μ XRF and laser ablation ICP mass spectrometry were also suggested for studying the inks. As some of the analysis requires the fragment being removed from the glass plates between which it is currently housed, options for conservation treatments and rehousing the fragment were also discussed.

Comparative material

Since the potential historic relevance of UBG Ms I 1946 was discovered, the authors have searched for material with similar features to better understand the fragment's wider context. So far, the examples that have been brought up as comparative examples for UBG Ms I 1946 have been early codices because no other objects have yet been identified that have a central fold and text layout comparable to the fragment, and holes similar in position and appearance to X and Y. One example with similarities is the 3rd century CE papyrus codex CBL BP I, which shows pairs of holes

16. See BAUSCH et al. 2022, 4931–50.

on either side of the central fold.¹⁷ In addition, bound sets of (wax) tablets were also suggested as analogues.¹⁸

The February 2024 meeting highlighted the pressing need to search papyrus collections worldwide for features that have been overlooked so far, especially because there had been no expectation for them to be found on pre-Christian papyrus fragments. Some such features would include: intentionally made folds, holes, text layouts, thread fragments, or any other indications for a sealed structure akin to UBG Ms I 1946. The analysis of other fragments from El Hibeh has already started and may yield more relevant material.

Conclusions

The close examination of the fragment has brought to light previously unidentified administrative practices from the Ptolemaic period, both in content and format. The vast majority of the experts present agreed that UBG Ms I 1946 is most likely a document written on a pre-folded sheet of papyrus, a bifolio, which was then sealed with tackets. This interpretation is supported by the material and textual evidence and explains all of its material features except the single set of holes X and Y. Although we cannot be certain about their interpretation, these holes are crucial for understanding the fragment and so need to be examined carefully. The methods of spiking and stab sewing discussed above provide potential but still inconclusive explanations for the presence of X and Y. While further investigation must be undertaken, it may not be possible to establish sufficient evidence to confirm or dismiss the theories set forth during the meeting.

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17. Other relevant examples which show a similar pattern of holes as CBL BP I are: P.Lond.Lit. 5 + 182 (the "Harris Homer", British Library Pap 126), P.Math (the Tchacos Math Codex; Princeton University, Cotsen Library Q 87167), SB 18 16911 (the Berlin leather notebook, P. Berol. inv. 7358/7359) and P. Louvre 2 94 (Paris, Louvre AF 11357 A + Paris, Louvre AF 11357 B [1]). In these cases, the holes come in pairs (that is, in each 'sewing station' there are two holes either side of the central fold, resulting in a set of four holes when the bifolio is open, rather than just a set of two holes as we find in UBG Ms I 1946).
 18. For example, CBL W 142.3–6 is a collection of four wax-filled wooden tablets containing two sets of matching holes and a single piece of leather thong which provide evidence for the construction of codex notebooks in wood. Similar examples survive from at least c.1300 BCE.

The conclusions we can draw from the comparative material that was examined are somewhat paradoxical. On the one hand, it appears that UBG Ms I 1946 is indeed unique, as no other documents from this period have yet been identified that show evidence of either a central fold or holes apparently connected to a method of sealing the document (or a temporary attachment, such as a stab sewing or spiking). On the other hand, UBG Ms I 1946 does not seem to have been created in isolation.

The chronology of when codices replaced scrolls is not clear cut, and the changeover did not happen at one point in time. Instead of being a sudden invention that occurred with the birth of Christianity, the bifolio format appears to have been attempted at different times and in different places long before the advent of Christianity. We must not confuse structure and material. Historic evidence suggests continuity in terms of structure, as scrolls (made from flexible materials such as papyrus, parchment or paper) were being used alongside diptych- or codex-like structures in the form of rigid bound tablets from at least as early as the fourteenth century BCE. The codex as we know it combines the composite structure of bound tablets with the flexible material of the scroll. The significance of UBG Ms I 1946 is that, in having been folded in half, it may exemplify an early stage in this crossover. A bifolio being the primary building block of a codex, UBG Ms I 1946 can as such be regarded a precursor to the codex form. Unique in its potential historical significance, the fragment deserves our continued study of its cultural and material contexts to come closer to understanding what it can reveal to us about the early developments in the history of the book.

The Graz February 2024 meeting participants

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