A Guide to the University of Toronto’s Classics Department Papyrus Collection at the Thomas Fisher Rare Book Library

M.A. Major Research Paper

BY

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Abstract

The Classics Department Papyrus Collection at the University of Toronto’s Thomas Fisher Rare Book Library was formed by Alan E. Samuel when he arrived at the University of Toronto in 1966. The collection consists of three inventory types: the Paper Towel (PT) Inventory, which was purchased in 1965 by Samuel when he was in Egypt; the Oxford University Gazette (OUG) Inventory, which consists of small fragments excavated from El Hibeh by Bernard P. Grenfell and Arthur S. Hunt in 1902 and 1903; and the Rostovztoff-Welles (RW) Inventory, which consists of larger papyrus fragments from the same source as the OUG Inventory. The entire collection is described in an appended catalogue that provides information on the condition and contents of each inventory designation and lists the storage method, material type, language(s), proposed date(s), document type(s), number of fragments and dimensions. The collection consists mainly of Greek documents and letters extracted from Ptolemaic mummy cartonnage dating to the third century BCE, but there are also a few Demotic pieces, as well as late Greek papyri, three Coptic pieces and one Arabic letter. In order to make the papyri readily available for scholarship and decrease their handling, they were photographed in visible light and near infrared. The near infrared photographs improve the legibility of the ink by increasing its visibility through thin layers of gesso and certain stains. Additionally, the contrast of the ink against the papyrus background is high at near infrared wavelengths, which improves the legibility of extremely darkened papyri and effaced, faded and washed out ink. Three Ptolemaic documents that were poorly legible in visible light, but significantly improved in near infrared photographs, are also transcribed and translated in this paper: a receipt for various tax payments, a list of names and payments, and a list of names for tax collection in arrears.
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Table 1. Three Sample Entries in the Preliminary Catalogue of the Classics Department Papyrus Collection...
1. Introduction

The Classics Department Papyrus Collection at the University of Toronto began with the arrival of the papyrologist and historian Alan E. Samuel in 1966.\(^1\) It consists of material from two sources: Samuel’s personal papyrus collection that he brought with him to Toronto in 1966 and the unpublished *P. Hibeh* fragments that he had shipped to the University of Toronto from the British Library in the late nineteen-sixties. The collection was housed in the Classics Department and used for teaching purposes until August 2004, at which time the bulk of the material was moved to the Thomas Fisher Rare Book Library (henceforth “Fisher Library”). The move was undertaken in order to further three goals: to house the fragments in better preservation conditions (the Fisher Library’s climate controlled environment);\(^2\) to allow conservation work to be performed by the library’s conservator;\(^3\) and to make the pieces more widely available for scholarship. The current research furthers these goals through the provision of high-definition photographs in both visible light (VIS) and at near infrared (NIR) wavelengths and a basic catalogue including descriptions for each inventory designation, which is appended to this paper. This paper additionally identifies the benefits of digital photography and NIR imaging techniques for the Classics Department Papyrus Collection, with a particular focus on the benefits for papyri extracted from mummy cartonnage since the majority of the fragments are of this type. As a sample of the types of documents available in this collection and to indicate the collection’s relevance in the field of Classical studies, a transcription, translation and

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3 Since 2004, Linda Joy has conserved a number of pieces in glass.
commentary of three papyri relating to taxation and other payments are provided in section seven of this paper.4

2. The Classics Department Papyrus Collection

The Classics Department Papyrus Collection is one of several papyrus collections currently in the city of Toronto. The Thomas Fisher Library also houses the Victoria University Papyrus Collection on permanent loan from Victoria University (Cobourg/Toronto), which amalgamated with the University of Toronto in 1890. The Victoria University Papyrus Collection consists of 36 Greek papyri dated from the third century BCE to the third century CE that were acquired between 1901 and 1906 as a result of donations to the Egypt Exploration Fund (EEF).5 Thirty of the papyri were excavated by Bernard P. Grenfell and Arthur S. Hunt from the Fayûm, El Hibeh, and Oxyrhynchus, and either published in full or described prior to their arrival at Victoria University.6 The remaining six papyri come from Theadelphia in the Fayûm and were not published, described, or listed by Grenfell and Hunt. A master’s thesis by Mahmoud Mohamed Sadek (1966) describes the papyri in this collection and provides references to publications about them.7 The Royal Ontario Museum (ROM) in Toronto also holds papyri, but nothing is known about these papyri and no pieces are currently published. The ROM also

4 OUG Inv. 121 fr. 1 and fr. 2, OUG Uncatalogued 61 fr. 1 and 2, and Miscellaneous 6 (RW Inv. 14A).
5 The online finding aid is “Papyri Collection: Manuscript Collection 175,” University of Toronto Libraries, 2013, accessed 11 May 2014, http://onesearch.library.utoronto.ca. This society was referred to as the Egypt Exploration Fund (EEF) from its inception in 1882 until 1919, at which time its name was changed to the Egypt Exploration Society; its history and activities are detailed in T.G.H. James, Excavating in Egypt: the Egypt Exploration Society, 1882-1982 (Chicago, The University of Chicago Press, 1982).
6 The *P.Oxy.* are numbers 265, 372, 426, 451, 493, 498, 499, 513, 560, 608, 637, 665, 725, 744, 753, 792, and 804; the *P.Fay.* are numbers 8, 30, 31, 55, 67, 111, 155, 170, 252, 266, and 307; there is only one piece from El Hibeh, *P.Hib.* 54. The remaining 6 papyri are *P. Fay.* from Theadelphia, but were not described or published by Grenfell and Hunt. All the papyri from this collection have been described and photographed; information and images are hosted online by the Advanced Papyrological Information System (APIS), Columbia University, accessed 18 May 2014, http://www.columbia.edu/cu/lweb/projects/digital/apis The images and information are now available through “Papyri.info,” The Duke Collaboratory for Classics Computing & the Institute for the Study of the Ancient World, Duke University Libraries, updated 2013, accessed 18 May 2014, http://www.papyri.info
has a collection of ostraka, which are published or listed in *O.Theb* and *O.Ont.Mus. 1* and 2.\(^8\)

The ostrakon collection is mainly Greek, but also contains some Demotic and Coptic fragments. Research on and conservation of the Classics Department Papyrus Collection could potentially benefit from collaboration with the ROM and the specialists in Toronto that work on papyri.

The Classics Department Papyrus Collection itself contains a large number of poorly legible or highly damaged fragments and, partly as a result of this, they have been the subject of very little research. Between 1966 and 2013, there have been no partial or full publications of the papyri. The collection is stored in 58 boxes numbered seven through 64 and it is divided into three sets of inventory designations: Paper Towel (PT) inventory, Rostovtzeff-Welles (RW) Inventory, and Oxford University Gazette (OUG) Inventory.\(^9\) The PT Inventory, which arrived at the University of Toronto stored in paper towels, is Samuel’s purchased papyri. The OUG inventory, thus named because it arrived stored in Oxford University Gazette newsprint, and the RW Inventory are the unpublished fragments excavated by Bernard P. Grenfell and Arthur S. Hunt from El Hibeh (Al-Hiba, Graeco-Roman Ankyron Polis or Ankyronon)\(^10\) in 1902-3.\(^11\)

There are also 23 other non-standard inventory designations. In total, the Classics Department Papyrus Collection currently consists of 353 inventory designations, a significant proportion of which contain multiple unrelated fragments making the total number of texts much higher.

### 2.1. The Paper Towel Inventory

The PT inventory consists of 75 designations that have been assigned numbers 1 through 112, with 65 unused numbers in the sequence and many duplicates. The unused inventory

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\(^8\) The *O.Ont.Mus.* series is also referred to as *O.ROM.*


\(^10\) Friedrich Bilabel, “Der Griechische Name der Stadt El-Hibe,” *Philologus* 77 (1921): 422-5 argued conclusively that this site be identified with Ankyron Polis and *P.Hib* 2 217 published in 1955 provides clear evidence.

\(^11\) Ibid., 1 states: “RW and Oxford University Gazette (OUG Inv.) papyri are apparently the Hibeh texts.” Numerous OUG folder notes indicate that this is true, for example, OUG Inv. 1a and 1b were removed from a folder stating “from Hibeh Package 6.”
numbers include 51 through 109. Each PT inventory number is followed by the sub-designation for the language of the text (Gr. for Greek, Ar. for Arabic, Ct. for Coptic), for example “PT Inv. Gr. 1.” The PT Inventory are almost all stored in acid-free paper (59 folders), but there are also three poly(methyl methacrylate) (PMMA) frames and 12 glass frames. The PT inventory designations vary significantly in their preservation conditions and dates: they are predominantly Ptolemaic mummy cartonnage, but there are also Coptic fragments and one Arabic letter.

As indicated above, the PT collection was personally acquired by Samuel, who said that he purchased it from papyrus dealer(s) in Egypt during his time at Yale University. The name(s) of the dealer(s) have not been recorded alongside the holdings, and all that is known is that the related papyri acquired by Yale University in 1965 came “from a dealer across from the Egyptian Museum in Cairo.” It is to be suspected that the PT pieces also come from this dealer. As a result, the provenances of the PT inventory papyri are extremely uncertain.

2.2. The Rostovtzeff-Welles Inventory

The RW Inventory has 116 designations labeled from 1 through 136, with 24 unused numbers in the sequence, two duplications and one piece without a number. These fragments were already preserved in frames when they arrived in Toronto, two of which are PMMA frames, and the rest are in glass. One frame has since been dismantled due to unknown circumstances and the fragments of RW Inv. 13 are now stored in acid-free paper. Each frame

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12 PMMA is commonly called Plexiglas, and is also known as Acrylite, Lucite, Perspex and acrylic or acrylic glass.
13 PT Inv. Ct. 30, PT Inv. Ar. 48 (49?) and Unmarked 3 (which is PT Inv. Ct 50).
14 Lougovaya, “Notes,” 1.
15 Lougovaya, “Notes,” 1.
17 PMMA becomes scratched relatively easily, and it is difficult to remove the papyri from it because static charge builds up between the plates, which causes parts of the papyrus or the ink to adhere to the PMMA when the plates are opened. The result is commonly a broken or illegible papyrus. W.F.H. Cockle, “Restoring and Conserving Papyri,” BICS 30, no. 1 (1983): 155.
contains between one and four fragments and an attempt has clearly been made to frame related pieces together, but occasionally unrelated fragments do appear in the same frame.\textsuperscript{17}

The RW inventory includes some of this collection’s larger papyri, and, although very few pieces are in great condition, they show significant promise for transcription and translation. Indeed, one papyrus in the RW Inventory had already been published when it arrived at the University of Toronto: RW Inv. 135C is the “Logical Exercise” \textit{P.Hib.} 184 published by E. G. Turner in 1955.\textsuperscript{18} The evidence for El Hibeh and the British Library as the source of the RW Inventory is strong, but it is still unclear why these fragments are named after Michael Ivanovich Rostovtzeff and Charles Bradford Welles, who were both faculty at Yale University and both acquired papyri for the Yale University’s Beinecke Library between 1931 and 1935. It is possible that the name arose because of a currently unknown connection that these two men had with the British Library—they were far-ranging academics heavily involved in papyrology, so this is a significant possibility—but in light of this coincidence, a connection between the RW Inventory and Beinecke papyri, although unlikely, should not be entirely ruled out at this point.

2.3. \textit{The Oxford University Gazette Inventory}

The OUG Inventory is mostly stored in acid-free paper folders that are numbered one through 124, with a total of 139 inventory designations. To make up this total, the sequence includes several irregularities: there are numerical duplications that are further identified by letter designations (for example “OUG Inv. 3A” and “OUG Inv. 3B”); inventory numbers 4, 5 and 6 refer to the same item; and there is no folder number 84. Additionally, one box of OUG papyri

\textsuperscript{17} RW Inv. 22 is an example of a frame containing two unrelated fragments. The hands are similar, but a close inspection reveals differences and the content has no clear connection.
\textsuperscript{18} \textit{P.Hib.} 184. R.A. Coles, \textit{Location-List of the Oxyrhynchus Papyri and of Other Greek Papyri Published by the Egypt Exploration Society} (London, The Egypt Exploration Society, 1974), 50 states that this papyrus is in the British Museum in 1974, when the papyrus was almost certainly already at the University of Toronto. The British Museum, Department of Egyptian Antiquities inventory number 2957 is given.
remains uncatalogued. The uncatalogued folders are designated “uncatalogued” 61 through 70 (OUG Unc. 61-70), and are currently stored in Oxford University Gazette newsprint dating from 1901 to 1906.

Gazette newsprint made up the original folders that held the papyri after they were extracted from mummy cartonnage. The paper of the newsprint is very low in acid and preserved the papyri well, but the majority of the fragments were transferred to acid-free paper in 2004. The now unused Gazette newsprint was set aside for storage separately. The newsprint is still useful to researchers because some notes about the papyrus fragments have been written on them (although they are clearly unreliable in many cases) and they sometimes indicate which mummies the pieces came from, which is important information that has otherwise largely been lost. Some inferences about the source mummies may be made from the grouping of fragments together in folders and boxes: the folders were made by placing together seemingly related papyrus fragments extracted from the same batch of cartonnage. Related fragments from the same cartonnage case, however, may also be widely separated because cartonnage was arbitrarily cut into smaller pieces for shipment to the UK in tins. Additionally, the selection and framing of large legible fragments for publication and distribution to donor institutions, along with the lack of information on the unpublished fragments, makes reconstructing the complete contents of a cartonnage case almost impossible.

As for how the Hibeh material (OUG and RW Inventories) arrived in Toronto, it is reported that it was acquired by Samuel from T. C. Skeat while Skeat was Keeper, Department

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19 For example, OUG Unc. 64 contains the note “E??69 head 4” and OUG Unc. 68 “97 foot 2.”
20 Segments such as “foot 1” and “foot 2” were created, such as mummy 97, foot 2 for the fragments in OUG Unc. 68. In 1938, the University of California Berkeley acquired the Tebtunis papyri still in Oxford Gazettes and the original shipping tins used by Grenfell and Hunt. This situation is similar to the Hibeh papyri fragments that also arrived in Toronto in Gazettes (albeit there is no evidence that the original tin boxes were used). The Center for the Tebtunis Papyri, “The Collection,” The Bancroft Library, University of California Berkeley, 2012, accessed 15 May 2014, http://tebtunis.berkeley.edu
of Manuscripts and Egerton Librarian at the British Museum (1961-1972). 21 The inventories are mainly the still unpublished fragments that were excavated from El Hibeh by Grenfell and Hunt in 1902 and 1903. Turner describes these as “an imposing bulk of fragments [that] still remain unpublished: it is very doubtful whether any returns they might offer would be commensurate with the effort involved,” 22 and, indeed, the OUG inventory consists predominantly of small scraps and highly damaged larger pieces. The appearance of the material itself is exactly as described by Grenfell and Hunt: mainly from “the middle of Philadelphus’ reign to the end of that of Euergetes I.” 23 A very small minority of fragments are from the Roman Period (such as OUG 4,5,6, according to its palaeography), which must be some of the finds that Grenfell and Hunt refer to as from “the accumulations of the Roman Period” on the nekropolis, 24 “some scraps of Roman papyri... found in one tomb,” 25 and “some second or third century fragments” from the ruins of the village. 26 Despite continued occupation of El Hibeh through the fifth century and possibly later, the Roman pieces excavated by Grenfell and Hunt are not later than the third century CE, and only 19 Roman papyri have been published from their excavations at El Hibeh, all of which appear P.Hib. II. 27

2.4. Other Inventory Designations

In addition to the three main inventories, there are 23 other non-standard inventory designations, most of which are unidentified or miscellaneous items (Unmarked 1, 5-16,

21 During Samuel’s time at the University of Toronto, one of the many things he accomplished was overseeing “the transfer of the unpublished Hibeh papyri from London to Toronto.” Bagnall, “Alan Edouard Samuel (1932-2008),” 8. At this time, T. C. Skeat was in charge of the fragments, J.K. Elliott, introduction to The Collected Biblical Writings of T.C. Skeat, ed. J. K. Elliott (Leiden, Brill, 2004), ix.
24 Ibid., 4.
25 Ibid., 6.
26 Ibid., 7.
27 Ibid., 4: in the nekropolis, “in the accumulations of the Roman period some small pieces of papyrus, none of which is later than the third century” were found.
Miscellaneous 1-3, 5 and 8, and Unidentified Frames 1-3), but there are also “SN 3” and “Folder 38,” on which there is currently no information. Another question that still remains is why there are so many gaps in the inventory sequences, particularly in the PT and RW inventories: according to the gaps, at least 90 inventory items used to exist, but either they never reached the Fisher Library or are no longer present. Some of the pieces from the PT inventory are now held by Yale University’s Beinecke Rare Book Library, since they were purchased from Samuel on February 24th, 1992. All the pieces he sold are related to Yale’s other 1965 acquisitions, which were in fact acquired by Samuel with funds donated by E. J. Beinecke. Additionally, a small portion of the unused accession numbers may be accounted for by fragments in the 21 miscellaneous or unidentified inventory designations. As work continues, some of these fragments are identified and the appropriate collection is noted.

3. The Hibeh Papyri: Excavations and Current Locations

Since the majority of the Classics Department Papyrus Collection was excavated or purchased from El Hibeh, a brief history of the excavations and relevant modern research on El Hibeh is appropriate at this point. An excellent overview of the El Hibeh site is provided by Carol Redmount, the current director of the excavations. Much of the information in this section is duplicated in her report, “El Hibeh: A Brief Overview.” The El Hibeh site is situated on the east bank of the Nile approximately 165 kilometers south of Cairo, and is named after the nearby

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30 For example, one fragment in the Unmarked 4 folder belongs with PT Inv. Ct. 30.

modern town (variants: El Hiba, Al Hiba, Al Hibah). The ancient town names were Teudjoj (ancient Egyptian), Ankyron Polis under Greek occupation (Ἀγκυρῶν πόλις) and, in Roman times, Ankyron village (Ἀγκυρώνον κόμη). Since Dynasty 26, the region has been in the twentieth Upper Egyptian nome, which became the Graeco-Roman Herakleopolites. The ancient walled-town was located on a limestone outcrop very close to the river, which was described as only a few meters away from the Nile in 1902. The town is surrounded by desert nekropoleis on the north, east and south-east sides (one of which the local Coptic community still uses). On the east side of the necropolis area, there is a rocky ridge that contains rock-cut tombs. The major features of the town itself are a temple established by Sheshonq I, Dynasty 22, and the very large western mud-brick wall. The site was occupied from the Third Intermediate Period through to at least the fifth century CE, and quite likely until much later.

Official archaeological excavations began in 1892 and were conducted intermittently until 2011. Prior to this, the site was significantly mined by antiquities hunters and sebakhin diggers, who used the sebakhin (decayed mud-brick) as fertilizer. The early archaeologists at El Hibeh were as follows: M. G. Daressy, who worked on the Sheshonq I temple in 1892; M. Ahmed Bey Kamal, the first official archaeologist at the site, who briefly excavated the temple

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33 Grenfell and Hunt, introduction to *The Hibeh Papyri: Part I*, 1: “the high desert at this point approaches the river edge, leaving only a narrow strip a few yards in width available for cultivation...”
38 Grenfell and Hunt, introduction to *The Hibeh Papyri: Part I*, 2: “by far the greater part of it [the necropolis] had been dug out before our arrival...”
For the Classics Department Papyrus Collection, the excavations of Grenfell and Hunt are the most important, since the OUG and RW inventories were produced by this work. Much relevant information is contained in the introduction to *The Hibeh Papyri: Part I.* They excavated for two seasons, from 24<sup>th</sup> March until 11<sup>th</sup> April, 1902 and in January, 1903. They focused on the nekropoleis around the town because they had previously purchased cartonnage reportedly excavated from there that contained literary fragments. Much of the ancient necropolis had clearly already been looted by the time Grenfell and Hunt arrived. They described it as strewn with “many broken Ptolemaic mummies and limestone sarcophagi” and other debris from various time periods. In total, more than 126 mummies were excavated by Grenfell and Hunt according the numbering scheme published in *The Hibeh Papyri: Part I* table of mummies. Many of the mummies are reported to have been wrapped in cloth rather than papyrus, but at least 19 cartonnage-wrapped mummies were excavated, which, along with at least 15 purchased segments of cartonnage, supplied the texts published in *The Hibeh Papyri: Part I* and *Part II.*

The Hibeh papyri are spread across many different institutions as a result of the following factors: the various excavations at the site, the subsequent movement of papyri between institutions, and the large number of Hibeh papyri that were sold on the antiquities market. Identifying the location of all the Hibeh papyri is beyond the scope of this paper, but a few significant related collections are noted. The *Location List*, although now slightly out-dated, lists the locations of the papyri excavated by Grenfell and Hunt and published in the *P. Hibeh* series,

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48 Grenfell and Hunt, introduction to *The Hibeh Papyri: Part I.*
49 Ibid., 1-3.
50 Ibid., 3.
51 Ibid., 12.
52 Ibid., the Ptolemaic mummies were “generally ornamented with detachable cartonnage, either of cloth or papyrus...”
most of which were distributed to institutions that had donated money to the EEF, including Toronto’s Victoria University. Additionally, after Grenfell and Hunt’s excavations, archaeological teams from Germany and Italy brought papyri back to their institutions.

Hibeh papyri purchased from the antiquities market are currently held by many institutions, the majority of which are in Europe. The earliest purchase of El Hibeh papyri was in 1890 by V. S. Golenischeff, who purchased three twenty-first dynasty hieratic papyri reported to have been found together in a pot at El Hibeh; they are currently in the Pushkin Museum of Fine Arts, Moscow. In 1896, Grenfell and Hunt purchased literary papyri published in \textit{P.Grenf. II} that had been excavated from an unknown location, and they later discovered more fragments of the same scrolls at El Hibeh. A large number of purchased Hibeh papyri have been distributed in Germany to member institutions of the Deutsches Papyruskartell, which made purchases off of the antiquities market from 1903 until 1914. Purchased papyri are relatively firmly identified as deriving from El Hibeh by meeting the following criteria: they are extracted from cartonnage; have a date in the third century BCE; and mention locations in the southern Herakleopolites or the northern Oxyrhynchites. Strasbourg, Gradenwitz (the relevant papyri

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54 Coles, \textit{Location-List}, 47-50, lists the papyri as in: the British Museum, The Bodleian Library, the University of Pennsylvania, Musées Royaux in Brussels, Harvard University, Karl-Franzens-Universität Graz, Metropolitan Museum of Art, Cambridge University, Yale University, Trinity College, Museum of Egyptian Antiquities in Cairo, University of Chicago, The Carnegie Library of Pittsburg, University of Toronto, Case Western Reserve University, McCormick Theological Seminary, Stanford University, Karl-Marx-Universität Leipzig (papyri were destroyed), Columbia University and Princeton.
55 The German papyri went to Heidelberg. Some of the Italian papyri are in Florence, Museo Archeologico.
56 Ricardo A. Caminos, \textit{A Tale of Woe: From a Hieratic Papyrus in the A. S. Pushkin Museum of Fine Arts in Moscow} (Oxford, The Griffith Institute, 1977), 1; \textit{P.Pushkin 120 (Story of Wenamun)}, 127 (\textit{A Tale of Woe}) and the Golenischeff copy of the \textit{Onomasticon of Amenemopet}.
57 Grenfell and Hunt, introduction to \textit{The Hibeh Papyri: Part I}, 5.
have been repatriated to Cairo at the Faud I University), Heidelberg, Hamburg, and Berlin, among other collections, are known to have acquired Hibeh papyri from this source.

4. Photography of the Classics Department Papyrus Collection

The Fisher Library has already devoted significant effort to the digitization of materials with the goals of increasing scholarly access and preservation in mind. Scans and digital photographs of the Victoria University Papyrus Collection and select pieces from the RW Inventory have already been published online. The infrastructure for the maintenance and distribution of the photographs produced from this project is already present. The storage of digital files, considering that the files can be corrupted and long term storage is relatively costly compared with microfilm, is worthwhile due to the ease of image distribution and the increased usefulness of digital files that can be manipulated to improve legibility for researchers. In particular, the images of the Hibeh papyri may be very useful to researchers because of the dispersed nature of the corpus.

There has been a recent ethical movement to repatriate culturally significant objects to source countries especially when pieces are exported through illegal sale or plunder. Compounding the problem of repatriation to Egypt, however, is that many thousands of objects have been removed since the eighteenth century, and their origins and current locations may not be known. Since the 1990s, lawsuits about objects that were illegally exported or plundered have attempted to curb the illegal removal and promote the recovery of culturally significant objects (William G. Pearlstein, “Claims for the Repatriation of Cultural Property: Prospects for a Managed Antiquities Market,” Law and Policy in International Business 28, no. 1 (1996): 123-150). How ethical was the recovery of papyri? There is little doubt that Europeans took advantage of the situation in Egypt, especially France and Britain; these activities continued while Egypt was a British Protectorate from 1882 until 1952, which includes Grenfell and Hunt’s activities (Hélène Cuivigny, “The Finds of Papyri,” translated by Adam Bülow-Jacobsen, in The Oxford Handbook of Papyrology, edited by Roger S. Bagnall (Oxford, Oxford University Press, 2009), 33). Numerous issues for repatriation to Egypt have been encountered even when it is decided upon as the best course of action: these include where to send and store objects, the availability of funds and specialists to curate objects once they have been repatriated, and, since 2008, political and social instability. Issues of cultural artifacts are discussed in Eleanor Robsen, Luke Treadwell and Chris Gosden, eds., Who Owns Objects? The Ethics and Politics of Collecting Cultural Artefacts (Oxford, Oxbow Books, 2006), and John Alan Cohan, “An Examination of Archaeological Ethics and the Repatriation Movement Respecting Cultural Property,” two parts, Environ 27, no. 2 (2004): 349-442 and Environ 28, no. 1 (2004): 1-115.

Falivene, The Herakleopolite Nome, 14-5.

Carl W. Griffin, “Digital Imaging: Looking Toward the Future of Manuscript Research,” Currents in Biblical Research 5, no. 1 (2006): 63. Griffin makes a number of points about the usefulness of digital images for researchers, such as the very high resolution of images, the relative ease in imaging at various wavelengths, the ability to increase the contrast of the ink against the background by selecting the best wavelength(s) and the uses of digital enhancements. He also notes the difficulties in maintaining digital files as compared with physical reproductions such as microfilm.
In addition to visible light photography, the decision was made to perform near infrared (NIR) photography on the Classics Department Papyrus Collection due to NIR’s known ability to increase the contrast of ink on papyrus. NIR photography records reflected NIR radiation (light) at wavelengths from c. 750 to 1000 nm. The current technique used for the NIR photography is called reflected infrared digital photography,\(^{63}\) which electronically records the reflection of NIR radiation.\(^{64}\) NIR photography was also possible using traditional film; it was invented in 1910 by Robert Wood.\(^{65}\)

The technique has been occasionally used on documents since it became popular in the nineteen sixties,\(^{66}\) but before digital cameras that have silicon sensors sensitive to infrared radiation up to c. 1000 nm were invented,\(^{67}\) the technical difficulties and expense of performing NIR photography on an entire collection was prohibitive. The first issue was the film: a special film was needed, such as Kodak High-Speed Infrared Film (which is no longer produced)\(^{68}\) and, as the technical data sheet for the Kodak High-Speed Infrared Film states, this type of film must be handled in complete darkness at all times including while loading the camera and developing the film (no red lights), and the camera itself must be made secure against any NIR radiation.\(^{69}\)

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High temperatures and high humidity also cause undesired effects on the film. In order to prevent these, the film should be kept at 13 degrees Celsius or lower and developed immediately after exposure. Additionally, this type of film cannot be enlarged much without loss of quality and is only sensitive to radiation up to about 900 nm, which is a significant restriction to the useful range of radiation for photography on papyrus. The final difficulty was that the filter for blocking out visible and ultra violet (UV) light must by its nature block visible light, which makes focusing through the lens impossible while the filter is attached. In practice, focusing on the papyrus must be performed first in visible light, and then the focus shift of NIR radiation must be adjusted for, but the adjustment was sometimes imprecise, which results in images with an undesirable soft focus. The focus shift occurs because NIR radiation has a lower refractive index than visible light when passing through the lens such that NIR radiation bends less causing the focal plane to be farther away from the lens. This was a cumbersome process, especially when attempting to take the same visible light photograph as NIR directly one-after-another. Overall, NIR film photography was only performed on carbonized, burnt and dirty papyri that had been identified as likely to contain information of particular interest to researchers and the general public, such as the Dead Sea Scrolls.

Currently, multispectral imaging, a relatively expensive and time-consuming project, is another technique that may be performed on papyri of significant research and cultural interest. Multispectral imaging records images at discrete wavelength bands, such as, for example, creating images that allow 50 nm of the electromagnetic spectrum to pass through a filter to the

71 NIR photographs of the Dead Sea Scrolls are reproduced in Eastman Kodak Company, *Applied Infrared Photography*, 34.
sensor at a time across a band ranging between 250 and 1000 nm. Data from the images can be compared or combined in order to identify different substances or see different features of the object photographed. For papyri, this technique has been successfully used on carbonized scrolls, such as the Herculaneum papyri that were photographed at 40 nm increments through the visible light and infrared regions. Visually, the 900-1000 nm band shows the most improvement in legibility for carbon-based inks on papyrus, but for documents on parchment and written with other inks, different bands provide images of increased legibility. Certain software algorithms may be used to analyze the minute differences in reflection and emission across the bands, allowing the computer to generate significantly enhanced images, especially for palimpsests. Constrained Least Squares (CLS) and Principal Component Analysis (PCA) have both been used successfully in the past and Hollaus et al. compare the results.

Multispectral imaging is very useful for determining the most effective band(s) for photography on specific documents and specific material types, and is highly useful for generating images of increased legibility using software algorithms for texts of high research and public interest. In the case of an entire collection, especially if there are no known pieces of high research and public interest, the technique is too expensive, time-consuming and, for papyri with carbon-

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based ink, it shows very little benefit beyond simple NIR photography to warrant its performance.

The generally poor condition of papyri in the Classics Department Papyrus Collection has made it an excellent candidate for demonstrating the benefit of NIR photography, which has been successful in the past in creating images of improved legibility for dark papyri, carbonized papyri, faded ink, salt encrustations and stains.\textsuperscript{79} NIR photographs increase the contrast between ink and the papyrus substrate, which is even beneficial for reading ostensibly legible papyri.\textsuperscript{80} The optimal wavelengths are from 900 to 1000 nm, and excellent results have been obtained in the past with a filter that selected wavelengths from 830 to 1200 nm.\textsuperscript{81} The results of the photography on the Classics Department Collection support this conclusion: papyri were experimentally photographed in infrared above wavelengths of 750 nm and 900 nm, with excellent results for both, and NIR photography proceeded using wavelengths of approximately 750 to 1000 nm. Select pieces encased in glass and PMMA, which both transmit NIR at a slightly reduced rate in comparison to VIS (figures 1 and 2), were also photographed and showed some benefit from NIR. In several cases, entire letters became clearly legible that were not apparent to the naked eye, although the majority of the pieces had less drastic improvements.

Photography was conducted on the Classics Department Papyrus Collection during three sessions: 19 February to 1 March, 2013; 26 August to 4 September, 2013; and 18 February to 19 February, 2014. The light conditions were controlled as much as possible in order to maintain consistency between images, but it was impossible to completely eliminate slight variances from sunlight and the various necessary camera distances (refer to figure 3 for the set-up). Papyri

\textsuperscript{80} Bülow-Jacobsen, “Infra-red Photography,” 185, concludes that “an infrared photograph is nearly always worth making.”
\textsuperscript{81} Ibid., 177 and 185.
larger than 17.0 by 11.0 cm were photographed using a separate configuration in which the camera was moved farther away, but the photographing area had less light, resulting in the need for an additional light source that was incandescent. The overall effect of the various light levels appears negligible, although if complete accuracy in colour analyses is necessary, a viewing of the physical papyri is advisable.

A Nikon D200 camera was used, which was modified by Lifepixel for NIR digital photography by removing the standard-feature IR cut filter (ICF) that blocks NIR from reaching the sensor. The ICF is necessary for digital cameras intended for visible light photography because the silicon sensor is naturally sensitive to NIR radiation up to at least 1000 nm, and without it the NIR radiation would cause colours to be rendered differently from what is seen by the human eye. The Nikon D200 has a 10.2 million effective pixel charge-coupled device (CCD) sensor, which allowed the papyri to be photographed at relatively high resolution. The number of pixels that make up each papyrus, or dots per inch (DPI), however, is the relevant measurement for assessing whether the resolution is high enough to be useful. The standard in the field of papyrology is to have a DPI of at least 300. The standard for this photography project was 516 DPI, at which most papyri were photographed, but some images of large papyri have only exactly 300 DPI, while the highest resolution photographs have 574 DPI.

The lens used was the Coastal Optic UV-VIS-IR 60 mm quartz lens that is ideal for photography from 315 to 1100 nm, for which wavelengths this lens model has no focus shift, meaning that the focus did not need to be adjusted at every change between taking VIS and NIR

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83 Many of the Victoria University Papyri were photographed with between 300 and 400 DPI, the variation results from size differences.
photographs.\textsuperscript{84} Non-NIR wavelengths were excluded from NIR photographs using a PECA 912 Filter mounted on the lens, which excludes electromagnetic radiation in the VIS range (400 – 700 nm), and allows maximal transmission in the NIR range between 750 and 1000 nm (figure 4).\textsuperscript{85} A flip-down filter-mounting device (Nikon AF-1 Gelatin Filter Holder) was used which allowed quick changes between VIS and NIR photographs. Indeed, for convenient VIS and NIR photography on large collections of artifacts, an apochromatic focus-corrected lens for VIS and NIR and the flip-down IR filter is very useful. Of course, a live preview function available on many digital cameras can also be used for re-focussing between VIS and NIR photographs instead of a focus corrected lens, but this often results in less precisely focussed images.

The camera was mounted stably on a copy stand over the photography stage. The stage had a white background and included a scale. Photography was triggered remotely from a computer using Nikon Camera Control Pro 2 to prevent camera-shake. High power xenon bulb Vivitar 285-HV with Zoom Thyristor flashes\textsuperscript{86} covered with SW-5IR clone filters that transmit almost exclusively NIR (figure 5)\textsuperscript{87} were used for NIR photographs and triggered wirelessly using a Cactus 4-channel wireless flash system. Xenon bulbs emit a significant amount of radiation in the IR range as well as VIS and UV. The SW-5IR filter controls the light that the documents are subjected to, blocking the higher energy and more damaging UV and VIS radiation, which is one reason to use flashes instead of other light sources. Additionally, while

NIR reflected photography can be done without an exclusively NIR light source,\textsuperscript{88} the most consistent results for NIR photography have been obtained using flashes controlled for NIR output, possibly due to minor VIS leakage through the filters.

5. Digital Image Processing

Adobe Photoshop CS 5 and CS 6 were used to process the camera raw image files and produce useable digital representations of the papyri. For VIS photographs, the process was as follows: raw colour correction adjusted the temperature and tint for the appropriate light source, the white balance was manually corrected, the photograph was cropped if necessary, and the photograph was saved as a TIF file with the appropriate papyrus-identifying file name. The format for the file names is the inventory designation as it appears on the frames or folders (usually “PT Inv. Gr.,” “OUG Inv.,” “Gaz. Fol.” or “RW Inv.” followed by the number-letter identifiers; these are identical to the inventory numbers in the preliminary catalogue) followed by a letter if there were multiple photographs for the folder (“a,” “b,” etc.). The same fragment(s) were usually photographed on their front and back: “(1)” identifies the front, or first side, and “(2)” the back, or second side. NIR images are identified with “ir” placed after the letter designation. For example, the file names for one inventory designation are: “Gaz. Fol. 7 a (1),” “Gaz. Fol. 7 a (2),” “Gaz. Fol. 7 a ir (1),” “Gaz. Fol. 7 a ir (2),” and repeated with “b” for additional fragments that did not fit in the first image. The TIF file format was chosen because it is an excellent high-quality versatile file format, although its large size can sometimes be

\textsuperscript{88} Bülow-Jacobsen, “Infra-red Photography,” 177, suggests working with Tungsten lamps, regular flashes or daylight, which will all work adequately.
inconvenient. JPEG files are small but not ideal because they lose encoded information each time the file is compressed when saved.\(^{89}\)

All adjustments that are made during processing are applied to the entire photograph, such that new information is not introduced or removed in different areas of the photograph. The processing is performed in batches, such that all the same processes are applied to images taken under the same conditions. The digital processing is simply aimed at best representing the actual pieces of papyrus as an image, and can be thought of much like developing physical film, which can also be performed in several ways to produce various results with different tones and levels of contrast. The AIC Guide to Digital Photography and Conservation Documentation provides a brief overview of the types of software (both free and for purchase) available for rendering RAW file formats to TIFF or JPEG and making the appropriate colour, contrast and brightness adjustments.\(^{90}\)

The NIR images were processed in a similar way to the VIS images, but the main difference is that the colours recorded by the camera sensor for NIR images are predominantly red-tones that are not a particularly useful way of representing the papyrus. Accordingly, the colour information was removed by converting the image to monochrome (grey-scale). It is possible to create a colour NIR photograph by combining a VIS and NIR image, which is the digital equivalent of a film-based false colour NIR (which used to be produced from film such as

\(^{89}\) Normal JPEG compression is “lossy.” Although lossless JPEG compression exists, it is not widely employed or supported. K.K. Shukla and M.V. Prasad, Lossy Image Compression: Domain Decomposition-Based Algorithms (London, Springer, 2011), 3; the introduction to this book provides a brief overview of lossy compression. 

\(^{90}\) Warda, The AIC Guide to Digital Photography, 51-6. Digital enhancement has been successfully used for increasing ink legibility for many years: John F. Oates et al., “Reading Invisible Ink: Digital Imaging of P.Duk.Inv. 716,” ZPE 127 (1999): 127-30 performed NIR photography and used digital sharpening and level adjustment in Adobe Photoshop to make distinctions in small colour/shade differences that are difficult to distinguish with the naked eye 15 years ago.
the Kodak Ektachrome IR film that was discontinued in 2007), but the benefit of increased ink contrast in the NIR photograph is diluted in this process. Such images are useful for certain applications, particularly in physics and biology, but are less useful for reading papyri since the colours may be distracting or confusing and a monochrome image is sufficient. In the future, false colour NIR imaging may be found useful for studies that identify different pigments, inks and stains from variation in their appearance in false colour images.

The process used on the NIR images was: 1) convert the image to monochrome, 2) adjust the black, white and grey assignments (using the Levels feature in Adobe Photoshop) in order to increase the contrast between the darks (ink) and lights (background, papyrus), 3) crop the image if necessary, and 4) save the image as a TIFF file with the appropriate papyrus-identifying file name. Adjusting the levels in Adobe Photoshop is one of the main methods for increasing the legibility of the ink in the NIR image, and it can be performed without loss of information for the shades representing the papyrus itself. In this process, the light shades of the background paper can all be converted to white and the darks made darker to broaden the display range for the grey tones of the papyrus. Just as for VIS images, the process is applied to the entire photograph such that information is not created or removed from specific areas of the photograph, which maintains the image as a faithful digital representation of the papyrus.

Once a papyrologist obtains an image, other techniques may also be employed to increase legibility. Colour deconvolution is an algorithm that currently is available for open source

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92 Warda, The AIC Guide to Digital Photography, 144.
93 By the 1970s infrared photographs were already being used in plant pathology studies, medicine and astrophysics. Some sample images appear in Eastman Kodak Company, Applied Infrared Photography, 41-44. False colour infrared film was initially developed for satellite imaging and other remote sensing applications, especially aerial plant biology surveys, Warda, The AIC Guide to Digital Photography, 167.
94 Warda, The AIC Guide to Digital Photography, 143-4, especially figure 100.
95 Ibid., 139, suggests a method for processing NIR photographs.
software such as ImageJ. This process separates colours then subtracts a colour from an image, which allows stains or distracting background colours to be removed.\(^97\) Another technique is decorrelation stretch (D-Stretch) which converts the normal Red-Green-Blue (RGB) colour space to another colour space, which allows one to detect colour information (slight colour variation) that has been encoded in the digital image, but is normally indistinguishable to the naked eye.\(^98\) As a result, letters that are present on the papyrus and encoded in the digital image, but are almost the same colour as the background, can be made visible. Neither of these techniques changes any of the information originally encoded in the digital photograph, unless the file is saved in a way that overwrites the original image file, but instead represents it differently to the viewer.\(^99\) As one may expect, the output of these processes do not create images that are true-to-life colour approximations of the papyri. The photographs maintained by the Fisher Library have not been modified with these algorithms, although some test cases have shown improved legibility. The use of these types of algorithms has been left to the discretion of individual researchers.

6. The Benefits of Near Infrared Photography for the Classics Department Papyrus Collection

As mentioned previously, NIR photography is useful for reading both ostensibly legible papyri and for garnering as much information as possible from very badly damaged fragments. This is because carbon ink does not emit or reflect photons in near infrared, while the papyrus


\(^99\) As long as modified images are saved separately using the “save as” function, the original files with the original information will be maintained.
background does, thus the background appears very pale and the ink appears very dark.\textsuperscript{100} As a result, in NIR, ink shows up well on very dark papyri and when the ink is faded, partially washed away or slightly effaced. Additionally, other substances also reflect and transmit NIR differently, such as stains, gesso and salt. Stains often transmit NIR, especially if the stain resulted from plant matter or certain minerals, such that they appear transparent or translucent.\textsuperscript{101}

NIR photography is also excellent for papyri extracted from cartonnage cases because the components of these cases often transmit NIR. Cartonnage cases for enclosing the dead came into common use by 800 BCE, and initially were linen and lime cases, but not long after this, cases were sometimes made of papyrus instead of linen and often used gesso, a hard-drying glue, instead of lime.\textsuperscript{102} The gesso (a gum and whitening adhesive, usually with calcium carbonate as the whitening agent)\textsuperscript{103} on this collection transmits NIR up to a moderate thickness, allowing letters to become clear through the residue present on many pieces. The outsides of cartonnage cases were painted, and on many fragments in this collection, thick layers of paint are also visible. Ink is not visible in NIR under thick paint, but the amount of reflectance in NIR can sometimes assist in identifying the specific composition of the pigments used, although this is beyond the scope of this paper.\textsuperscript{104} The other reason that NIR is beneficial for papyri from

\begin{footnotesize}
\textsuperscript{100} Bülow-Jacobsen, “Infra-red Photography,” 184.
\textsuperscript{101} Eastman Kodak Company, \textit{Applied Infrared Photography}, 51: NIR radiation passes through the stain or covering material and reflects from the underlying material back to the image sensor, thus the underlying ink and papyrus are visible.
\end{footnotesize}
cartonnage is that the procedure of extracting cartonnage from mummies was often destructive in the early twentieth century,\textsuperscript{105} when the Hibeh papyri were extracted. This process probably produced the many small and poorly legible OUG fragments that have benefitted significantly from NIR photography. The following examples of improved legibility are almost all much damaged papyrus cartonnage fragments.

\textbf{6.1. A Very Damaged Papyrus}

PT Inv. Gr. 3 consists of two extremely damaged papyrus fragments displaying a moderately small and neat hand. In VIS, several dozen letters are distinct, but the NIR image makes ink apparent where stains and darkening of the papyrus make it difficult or impossible to see ink in VIS, and NIR has been very useful when used in tandem with the VIS photograph. For example, an alpha in line 11 of fragment 1 that was completely obscured in VIS appears in NIR, and a red stain in the line below becomes less distracting (figure 6). Areas of darkened papyrus, such as on fragment 2 at line 9, show more ink contrast. NIR photography, however, cannot work miracles, and lines seven to nine on fragment 1 do not display much more ink in NIR than VIS.

\textbf{6.2. Stains}

OUG Inv. 18 consists of five small fragments. Fragment 1 has a very dark brown stain that obscures more than half of the fragment. The infrared image shows five partial lines through the stain in a different hand from the letters easily visible in the second column (figure 7). Line four, column 1 reads \( \xi\pi \chi\rho\tau\omicron\nu \) indicating that this document has something to do with agricultural activities (\( \chi\rho\tau\omicron\nu\) is pasturage or fodder, especially for horses or cattle).

\textsuperscript{105} Wendelbo, “The Freeing of Papyri,” 42, references destructive “methods with plain water, boiling water, steam, acids...”; Wright, “A Method for Extracting Papyri,” 122, describes a more recent method that is still problematic since “the paint layer splits leaving some of the painted gesso adhering to the papyrus.”
OUG Inv. 101 fragment 3 has a very dark brown stain similar to OUG Inv. 18 that obscures a few letters (figure 8). The letters revealed in the first two lines implicate some sort of account, perhaps of wheat or other agricultural produce, if one assumes that the abbreviation is to be rendered as ἀρτάβας as follows:

1]ἀρ(τάβας?) ριε ε[  

2] ἀρ(τάβας?) χπ ζ[

It is difficult to determine the exact types of stains present on these papyri, but the amount that they transmit NIR may be used in the future to narrow down the possibilities.

Stains in combination with other problems, such as holes, traces of gesso and effaced ink can be very problematic, such as in OUG Inv. 91 fragment 1. In VIS, only a few letters are clear, but NIR reveals many clear letters in each line, particularly lines five and seven (figure 9). In line five there is perhaps written ἐδιψον οι , ἀσφφλι / εβγπ / ἐλ[

6.3. Gesso

OUG Inv. 9 fragment 1 is covered with a relatively thick layer of gesso that only allows a few letters to be read in VIS, while in NIR, 12 lines, albeit still difficult to read, are apparent. In particular, line six shows much more ink contrast, the end of which reads βολαι (figure 10). Several places are still too thick to transmit NIR.

A thick layer of gesso covers several parts of OUG Inv. 121 fragment 1 and completely obscures the writing in both VIS and NIR, but the rest of it is covered with thinner layers of gesso, which transmit NIR significantly (figure 11). As a result, the end of line one becomes very clear in NIR, reading ἐ Φαµενὼθ. Other notable improvements are the date in line four, which appears through a relatively thick gesso layer, and γεωµετρικὸν in line 12, which comes
through thin gesso remnants; nearly all the lines gain significant improvement in NIR. This papyrus is one of the three that are edited at the end of this paper.

6.4. Dark papyrus

OUG Inv. 94 contains two related fragments of very dark papyrus, among a total of six fragments. Three lines of letters and traces of ink appear even in VIS on fragment 6, but reading it is extremely difficult without the NIR photograph (figure 12). In NIR, a practiced hand is apparent, and the letters can be distinguished. Line two appears to be: \( \tau \alpha \tau \omicron \omicron \tau o \omicron \omicron \zeta \ldots \) (traces). The other fragment in the same hand has corrections and interlinear additions, which indicates that this papyrus could be a draft, possibly of a letter.

OUG Inv. 121 fragment 2 is a very dark papyrus that is also covered with gesso (figure 13). In this case, the papyrus did not show up as pale in NIR as most of the other pieces, but the result still increases the legibility. In VIS, enough of the ink can be seen to read:

1. \( \beta \alpha \sigma \iota \lambda \varepsilon \ldots \tau \omicron \lambda \epsilon \mu \alpha \iota \omicron \upsilon \nu [\]
2. \( \eta \theta \epsilon \nu \ldots \ldots \nu [\]

which is still identifies it as a Ptolemaic dating formula. In the IR photograph, the following appears quite clearly:

1. \( \beta \alpha \sigma \iota \lambda \epsilon \upsilon \nu o \nu \tau \omicron \lambda \epsilon \mu \alpha \iota \omicron \upsilon \nu \nu [\]
2. \( \eta \varsigma \theta \epsilon \omega \nu \acute{\alpha} \delta \epsilon \lambda \varphi \omicron \upsilon \nu [\]

This fragment must be from the reign of Ptolemy III Euergetes (January 246 - February 221 BCE),\(^{106}\) since the only possible way to complete the first line is with \( \tau[\omicron \omicron \Pi \tau \omicron \lambda \epsilon \mu \alpha \iota \omicron \upsilon \nu \kappa \iota \omicron \Lambda \rho \sigma \iota \nu \omicron \upsilon ] \). The implications of this are discussed in section 7.1.

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6.5. Effaced Ink

OUG Inv. 59 contains 14 fragments, and the largest fragment, fragment 1, is a very damaged letter that suffers from faded ink and an abraded surface (figure 14). In VIS, no more than minor traces of writing appear on the upper portion, but in NIR, the upper portion shows a few clear letters. Two-thirds of the way down, ἔρρωσο appears in the center of the line, after which there are six more fairly clear lines.

6.6. Washed Out Ink

Misc. 6, which has been tentatively identified as RW Inv. 14A, is a list of names for tax debt payments. The bottom-right portion is very faded, with most of the ink washed away, and the NIR improvement occurs predominantly because of the increased contrast between the ink traces and the background (figure 15). Using both the VIS and NIR photographs, the lines 11 to 13 of column two can be read as:

11 / Σαµῶν Μίκρος Σαµόω[τος
12 X Νεχθεῦτις Φαβήτος [ [
13 X Ἀχµάσις Αµῶτος [ [

This document is also edited and translated in section 7.3.

6.7. Near Infrared Imaging through Glass

Some of the pieces framed in glass and PMMA are also in poor condition, and, since NIR is mostly transmitted through glass (figure 1), NIR photographs also increase the contrast of the ink against the background. NIR performs slightly less well through glass than without a frame around it, and the difficulties of applying sufficient NIR light and minimizing glare on the glass make the photography somewhat difficult, but the results are often worthwhile. RW Inv.

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129 is a damaged fragment stored in a glass frame. This papyrus suffers from blurred ink and darkening of the papyrus substrate (figure 16). It is a Ptolemaic account of money, probably of expenses (e.g. for papyrus, χάρτας, line five), written in a slightly stilted hand with highly irregular line spacing. The NIR image significantly improves the contrast between the ink and papyrus, and it is indispensable for the decipherment the first four lines and the last two lines.

One must do a cost-benefit analysis between opening glass plates to obtain better images and leaving them closed while photographing. Overall, it seems better to avoid the possibility of damage to the papyri and leave the glass plates closed as much as possible, especially since this collection has many plates that have not been opened in decades and the papyrus may be stuck to the glass.

6.8. Near Infrared Imaging through Poly(methyl Methacrylate) (Plexiglas)

PT Inv. Gr. 3 fragment 1 is the largest of a group of eight small fragments housed in a poly(methyl methacrylate) (PMMA) frame. The pieces were extracted from cartonnage and show thick gesso at places. The NIR photograph of fragment 1 allows line six to be read as πρὸς τας of which the ρ and part of the π and o are covered with gesso (figure 17). PMMA appeared slightly more reflective of NIR than glass while photographing it and it was quite difficult to avoid overexposing the images, but enough was transmitted that it was possible to adjust the camera settings to compensate (figure 4 shows IR transmission). The results function well enough that NIR photography through PMMA sheets is advisable in future projects. Indeed, since the PMMA plates cannot, at this time, be opened due to static charge build-up, imaging is the only way to view ink behind obstructions.

108 For example, as J. Lougovaya, “Notes,” 1, reports for RW Inv. 11 (red label) that “it should not be opened, except by a professional, since much of the papyrus is securely stuck to the glass.”
7. Select Papyri: Transcriptions, Translations and Commentary

As a sample of some of the documentary papyri available in this collection, in this section four papyri in three separate inventory designations are presented. Documentary papyri make up the majority of the collection, with personal letters and petitions making up a significant minority of these, and possible literary fragments being very few and very difficult to decipher. The pieces presented here are OUG Inv. 121 fragment 1, a tax receipt, OUG Inv. 121 fragment 2, a dating formula, OUG Unc 61 fragment 1 and 2, a list of names and payments, and Misc. 6 (RW Inv. 14A), a list of names for tax collection in arrears. Each piece was selected because multiple words or lines became visible in the NIR photographs. Where the examples were relevant, they have been introduced in the previous section on the benefits of NIR photography.

7.1. OUG Inventory 121

The accession number OUG 121 refers to two unrelated fragments. The first, fragment 1, is a dated receipt mentioning tax payments, which bears striking similarities to the tax receipt P.Hib. 104, except for the scribbled calculation in the last line of OUG 121 fr. 1. Its overall condition is poor: it is covered on the front with gesso remnants and thick pieces of gesso, and it has two very jagged edges and several small holes (figure 11). Fragment 2 is smaller than the first and the papyrus is very dark brown. It displays two lines of a Ptolemaic dating formula

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109 The terms “front” and “back” are used in this paper as opposed to “recto” and “verso,” which came into use in the early modern period. Recto and verso were initially used in codicology to mean the front of a sheet and the side that it is turned over for, but are slightly misleading in the context of papyrology, as first noted by Eric Gardiner Turner, The Terms Recto and Verso: The Anatomy of the Papyrus Roll (Brussels, Fondation égyptologique Reine Élisabeth, 1978). Regarding parchment and papyrus, recto began to mean the side that was superior for writing, which was the flesh (rather than the hair) side of a piece of parchment and, due to the method of constructing papyrus rolls, the side with horizontal fibers for papyrus. Therefore, the notion of the recto as the side with the horizontal fibers is preferred in papyrology, and this is often synonymous with the front, but non-standard papyrus usage makes these terms confusing. For example, in Byzantine papyri the practice of writing charta transversa was common. In these cases, the papyrus is turned such that the writing on both the front and the back is along the fibers. The verso must then be determined from a kollesís, if one or more appear, and does not mean the side written against the fibers. Additionally, there are cases in which writing only occurs against the fibers or, and then recto does not mean along the fibers but becomes the front. There are multiple cases of writing occurring only against the fibers in the Classics Department Papyrus Collection, such as the letter PT Inv. Gr. 22(32?). To avoid confusion, the “front” and “back” of each document is defined.
followed by nearly invisible traces of four lines (figure 13). Three small scraps, one of which has the same dark brown appearance as fragment 2, are also present in the folder.

**Fragment 1:** Receipt for various tax payments

Oxyrhynchites or Herakleopolites?  
16.2 x 8.4 cm  
April/May 233 [or 208?] BCE

The front preserves 14 lines written along the fibers, with a large gap between lines three and four large enough for at least five lines. The content indicates that the right margin is preserved, although some lines run as close as 0.05 cm to the edge and others end approximately 5 cm from the edge. Additionally, the irregularities of the right edge make it difficult to determine if this was the original edge, or if the document consisted of multiple columns and happened to rip between two columns. The top margin is 0.6 cm, but only preserved on the right side for 2.4 cm, after which it breaks away irregularly. The bottom of the document does not have any straight edges, but there are no traces of ink for 3.1 cm from the last line to the surviving tip of the papyrus, which indicates that this could either be the bottom margin or another gap.

The entire document is written in the same hand: it has blocky upright letters with numerous sharp corners and noticeable spaces occur between most words. The strokes are thick and the ink is dark. The hand is clearly Ptolemaic and shows characteristics such as a shallow dip between two upright strokes for the mu, a highly raised and slightly curved final upward stroke on the nu, and little definition on the second concave portion of the omega.

The back of the document has darkened much more than the front, and shows traces of five completely illegible lines, with four of these lines running at a diagonal tilted approximately 45 degrees from the horizontal. The centre-right section on the back has been significantly mangled, with numerous fibres out of place. The bottom is still obscured by two centimeters of red and white painted stripes, which identifies the back of the document as the outside layer of a
mummy-case. The gesso remnants on the front are from where it was pasted to another papyrus layer; these could conceivably be cleaned away by a restorer. Should this happen, the reading may be clarified for lacunas caused by gesso in lines four, five (at the first lacuna only), nine, ten and twelve.

fr. 1, front

1 (ἔτους) ἱδ, ὡς δ᾽ αἰ πρόσοδοι (ἔτους) ἐφ Φαµενὼθ
2 -c. 5-]μεν ἀργυρίου ἢβ (τριώβολον)
3 ἀργυρ]ίου? ἢθ
4 (ἔτους) ἱδ, ὡς δ᾽ αἰ π]ρ[όσοδοι (ἔτους) ἐφ φαµε-
5 νώθ -c. 8- ]ω Ψο[...] [...] παρὰ
6 -c. 10- ]ρ διὰ Μάρου Κεφάλα λ/λ-
7 -c. 11- ], οὐ εἰς τὸ ηθ (ἔτος)
8 -c. 12- ] τρεῖς (διώβολον) διάχωμα
9 -c. 7- ]φ[...], πη[...], ἐα (τριώβολον) (διώβολον)
10 -c. 14- ]το[...], δ[...],κτω
11 -c. 11- ], α (τριώβολον) στεφάγων
12 -c. 5- ], ν[...] ἐν (τριώβολον) (διώβολον) γεωμετρικόν
13 -c. 5- ἁλικῆς δύο (διώβολον)
14 -c. 3- ], (δραχµαί) ἢβ (τριώβολον), λ(οιπαί) ἢθ

fr. 1 back

Traces of five illegible lines
Apparatus

1 L  2  4 L  6  7 L  8 =  9 \(\gamma\varepsilonωμετρίας\)  12 =  l.  13 =  14 \(\varepsilon\upsilon\)  

1 Year 14, which is] the 15\textsuperscript{th} year according to the financial calendar, Phamenoth

2 ... ] twelve and a half silver (drachmas)

3 silver (drachmas): nineteen

4 Year 14, which is] the 15\textsuperscript{th} year according to the financial calendar, Phamenoth...

5 ... to? ..]. the son of Pso ... from?

6 ] through Maros? son of Kephall-?

7 ] ... for the 18\textsuperscript{th} year

8 ] three diobols; the embankment tax

9 ] ... triobol, diobol;

10 ] ...

11 ] ... triobol; the crown-tax

12 ] ... triobol, diobol; the land tax

13 ] the salt tax: two diobols

14 ] twelve and a half drachmas ... remaining?: nineteen (drachmas)

\(\omega\iota\sigma\ \delta\prime\iota\ \pi\rho\omicron\sigma\sigma\delta\omicron\omicron\ έτους\) “year (number) according to the financial calendar...” is a portion of a relatively rare dating phrase\textsuperscript{110} that is only employed when the author feels it is necessary to indicate that specifically the financial calendar is being used. The financial

\textsuperscript{110} There are 14 examples, some written when the financial year and the civil year were the same, and others when the two years were nonsynchronous: \textit{CPR} 18 1.1; 19.5-6; \textit{P.Enteux}. 30.2; 79.2; 80.3; \textit{P.Hamb}. 2 171.2-3, 11; \textit{P.Heid}. 6 383.11-12; \textit{P.Köln} 6 259.4; 260.6; \textit{P.Petr}. 3 58 (c) 1; (d).1, 6; \textit{P.Ross.Georg}. 2 3.10; \textit{P.Tebt}. 3 1770.18; \textit{SB} 10 10273.16-17; 20 15001.2.
calendar was only employed from the second half of Ptolemy II Philadelphus’ reign until the beginning of Ptolemy V Epiphanes’ reign, c. 267 until 202 BCE, thus restricting the possible dates for this document.\textsuperscript{111}

This formula, which usually occurs without invoking the names of the ruling monarchs,\textsuperscript{112} has the following format: (ἔτους) (number) ὡσ δ’ αἱ πρόσοδοι (ἔτους) (number) (month name) (day number). Since the financial calendar begins 1 Mecheir, while the Egyptian civil calendar begins 1 Thoth, the two calendars are non-synchronous for half of the year, with the financial calendar always ahead by one year\textsuperscript{113} from the first of Mecheir until the end of the year (5 Epagomena). This is relevant for the present document because Phamenoth is the month after Mecheir, so the financial calendar year must be one year ahead of the civil calendar. The first line can, thus, be filled in according to the abovementioned formula, with (ἔτους) ὡσ filled in for the missing civil calendar year. Unfortunately, the day number is irretrievably lost.

It is most probable that the complete first line is (ἔτους) ὡσ, ὡσ δ’ αἱ πρόσοδοι (ἔτους) ιε Φαµενὼθ. The only other possibility is the inclusion of the monarch names, but this only occurs in one other papyrus and fills up nearly 2 lines on its own.\textsuperscript{114} The presence of the top right margin makes it unlikely that the top line is missing. Assuming that nothing else was written before the ἔτους, the complete width of the papyrus can be estimated. In the missing

\textsuperscript{111} UPZ 1.112 is a contract for taxes dated to 203/2 BCE, and, although part of the papyrus is lost, the editors identify this as a papyrus with both a financial and a civil calendar date, lines 1-3: εἰς τὸ α (ἔτος) | [καὶ τὸ β (ἔτος) ἀπὸ μην]ός Μεσορή εἰς δωδεκάμηνον | [καὶ τὰς ἐπαγοµένας] ἡµέρας ε. If this interpretation is correct, which is not certain, then this is the most recent document known to be dated by the financial calendar.

\textsuperscript{112} The only documents that do name the monarchs are P.Petr. 3 58 (c) 1-3 and (d), 5-7.

\textsuperscript{113} This is the case since during all the relevant reigns succession dates were between Thoth and Mecheir, so the financial calendar would move ahead one year before the civil year changed over. Additionally, Ptolemy II instated the financial year about half-way through his reign on a date that must have been between Thoth and Mecheir. Skeat, Reigns of the Ptolemies, 10-12.

\textsuperscript{114} P.Petr. 3.58 (c): [βασιλεύοντος Πτολεµαίου τοῦ Πτολεµ[αίου] | καὶ Άριστος θεὸν Αδελφῶν (ἔτους) τα ὡς δ’ [αὶ πρόσ-] | ὁδοὶ (ἔτους) Ψβ
portion, ἔτους is almost certainly abbreviated, just as it appears later in the line. L takes up approximately 0.6 cm, the omega 0.5 cm, and the iota and delta together would require at least another 0.5 cm, which is 1.6 cm for the rest of the line. As a result, a full written line would be 8.3 cm, which is narrow, but entirely plausible, such as the full width of P.Hib. 104 at 7.4 cm. The lost character estimates for the rest of the lines are calculated from the average characters per centimeter across the 11 clear line remnants, which is three characters per centimeter. These are, of course, estimates, and at places, as many as four or fewer than two characters per centimeter occur.

(ἔτους) ιε Φαµενὼθ (ἔτους) ιε Φαµενὼθ (ἔτους) ιε Φαµενὼθ (ἔτους) ιε Φαµενὼθ refers to the fourteenth year of either Ptolemy III, which is April/May of 233 or the fourteenth year of Ptolemy IV, which is April/May of 208.115 By the fourteenth year of Ptolemy V, a financial calendar distinct from the civil calendar was no longer used. Ptolemy II is eliminated because the financial calendar had not yet been established in the 14th year. The year is most probably 233 BCE because the salt tax price is consistent with this year and fragment 2, which was most likely extracted from the same mummy, is dated to Ptolemy III’s reign.

2 (τριόβολον) is written with the symbol ¶, which is commonly used during the Ptolemaic period for three obols, which is half of a drachma.116

3 ἀργυρ[ι]ς[ι]κ is written with the symbol ι, which is quite uncertain; it could actually be a β or ε. This is presumably silver drachmas, and could be the total amount still owed or paid for the taxes.

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115 Skeat, The Reigns of the Ptolemies, 11-12.
4 (ἔτους) ἰδ, ὡς δ' ἀι π[ό]σοδοι (ἔτους) ἵ ῶ φαμε- is a duplication of the date formula at the top of the document (line 1). Duplicate tax receipts appear like this, as is the case for P.Hib. 104. The similarities make the interpretation of this as a duplicate receipt tempting, but if it is a duplicate receipt, then the top entry (lines 1-3) certainly does not detail each tax paid as is the case for the bottom one entry, so it is not an exact duplicate as is P.Hib. 104.

5 Ψο is a common beginning for Egyptian names. A name in this position would make sense particularly if the preceding ω is the end of a name in the dative without an iota adscript. The combination ωψο is an extremely unusual, and is only attested in a spelling mistake for ὅψώνιον.

6 δι' Μάρου is not an entirely certain reading because thick gesso obscures the lower three-quarters of the central letters, thus another very similar name could be written, or what is interpreted as two words could be one. If it is a name, it is difficult to fit any more letters into the space, and the elision must be taken into account for names beginning with vowels, such as δι’ Ἐφέσου. Μάρος is an attested name, although only confirmed in documentary papyri between the first century BCE and the second century CE. Alternatively, as in P. Hib. 1 104, the reading could be Διοδώρου Κεφαλλάνος, but reading Διοδώρου places a strange gap between the first omicron and the second delta. The similarities of the two receipts make this reading tempting, and if this name fit better, it would be likely that the same person is mentioned in both receipts.

Κεφάλλ- can be the beginning of the names Κεφαλλάνος, Κεφαλλωνίος and Κεφαλλήν. Furthermore, it is an attested mistake for κεφάλαιον or for names such as

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117 Such as Ψοθευς, Ψοβητος, Ψούφες, Ψοθευς and Ψονόνι among others.
118 SB 16 12694.11.
119 P.Mich. 1 38.53.
120 SB 6 9109.2.
Κεφάλων. The first lambda has been added as a correction. In this position, we would expect either a patronym for Maros [or Diodoros], or an explanation of what is being transferred between the parties, which would make κεφαλων a reasonable possibility. If we assume that the writer did not make a mistake, as one should do whenever possible, the reading is Κεφαλλ- for the patronym.\textsuperscript{121}

7 ου is most likely the genitive ending of a word, here it could be ἀργυρίου, referring to the amount of silver drachmas. The traces could also be μου.

εἰς τὸ η (ἔτος) has many parallels, and the construction was particularly common during the Ptolemaic era,\textsuperscript{122} especially in receipts such as the abovementioned \textit{P.Hib.} 104.3.\textsuperscript{123} This type of date also occurs throughout \textit{P.Petr.} 3 109, which is a tax assessment and payment list covering three years and εἰς τὸ (number) ἔτος specifies the year for which the tax amounts were due. The fact that this date is three years into the future is problematic for these payments. This should probably be interpreted as a mistake for ώ.

8 τρεῖς (διώβολον) is three diobols, which is 1 drachma; the name of the tax is completely obscured by gesso.

διάσχωμα refers to what is commonly called the embankment tax. It is a relatively rare word, and somewhat obscure in its meaning, both in the context of the tax and for irrigation works. As a tax, it is mentioned in three separate documents in the third century BCE,\textsuperscript{124} which is very few times as compared with hundreds of mentions of the χωματικόν, the mandatory labour or tax for maintaining dykes, which was levied in Ptolemaic and Roman

\textsuperscript{121} The lack, however, of patronyms is common, as in the abovementioned \textit{P. Mich.} 1 38, where the facilitating parties are most often not accompanied by patronyms, and only occasionally specified as being banking officials.

\textsuperscript{122} There are more than 100 examples of the phrase used in various during the Ptolemaic era, such as \textit{BGU} 6 1226.7 a seed receipt for a cleruch, while perhaps 20 are Roman, none are later than 262 CE.

\textsuperscript{123} For example: \textit{BGU} 6 1229.6, 1230.15, 1427.1; \textit{O.Wilck.} 1022.5 specifies ἐν τῶι η (ἔτει) εἰς τὸ θ (ἔτος); \textit{P.Mich.} 3 193.8; \textit{P.Hib.} 1 87.8 = \textit{P.Yale} 1 31.8; \textit{SB} 8 9794.2.

\textsuperscript{124} \textit{P.Grad.} 6.3, 9, 13, 17; \textit{P.Hib.} 104.4, 10; \textit{P.Petr.} 3 110 (a) 4, and (b) 8.
times. As noted by John P. Mahaffy and J. Gilbert Smyly, the two taxes must be a separate since both are mentioned in the same receipt, *P.Petr. III* 110 B lines 8 and 9. Von Reden suggests that the διάχωµα is a tax infrequently levied to repair cross-dykes specifically, rather than the embankments for the main channels. The word is occasionally used to refer to embankments for irrigation works, and it always refers to actual embankments when used in the plural.

9 φ[...]πη[...]εξί these traces are very unclear. The φυλακιτικόν is a tax paid in cash commonly in conjunction with the salt tax (ἁλική), so we might expect it here, but this word does not match the traces. No satisfactory tax or fee name is forthcoming, but the best possibilities are προφήτου παρουσία and φόρος βαλανείου. Alternatively, a number could follow the tax name. ἐννέα fits the traces, and would help increase the total towards 12 and a half drachmas. This line ends early, leaving a blank space of 1.2 cm.

10 This is a much damaged line, which could end with the number ὀκτώ.

11 στεφάνων refers to the crown-tax, for example in *P.Tebt. III* 746.34. This tax is levied directly by the state in times of financial need.

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125 For example, BGU 2 485; 4 1198; 7 1614; *P.Hib. I* 119; *P.Lille I* 30; *P.Paramone* 8; *P.Sakaon*. 53.
128 *P.Cair.Zen.* 1 59073.3; *P.Lond.* 7 2173.7; *P.Petr.* 3 43 (2) recto col. IV.7, verso col. IV.6; *P.Zen.Pestm.* 7.6-7, 13-4; 8.6-7; 11.4, 10.
129 Claire Préaux, *L’Économie Royale des Lagides* (Brussels, Éditions de la Fondation Égyptologique Reine Élisabeth, 1939), 591-5 supplies an extensive list of tax and fee names. Some considered for this position are the taxes and fees that could end in epsilon alpha, Ἀγαθοκλέους δωρεά, ἂρταβιεια, Ἀριστολάου δωρεά, Δικαιάρχου δωρεά and ἐρέα; and those that have a φ, ἀμφότερον, γναφαλλολόγος, γαφείικ, γραφείον, έκφοριον, ἐπικεφάλιον, θησαυροφυλακιτικόν, ἰερὸς ἑλέος, ἰπποῦ φόρος, ἰστείων λινυρία, ὀρφανός, ὀλυμπία, ὁρμοφυλάκια, ὀρφανός, πορφυρική, προφήτου παρουσία, σῖτος φορικός, στέφανος, στέφανος χρυσικός, τέλος ταφῶν, τέλος τῶν ὑραντικῶν, φακεψός, φόρετρον, φόρος ἀμφερλάνον, φόρος βαλανείου, φόρος ζυτηράς, φόρος ζυτοπωλίου, φόρος τῆς μαγειρίκης, φόρος τοῦ παραδείσου, φόρος προβάτων, φόρος χηνῶν (τοκάδων), φυλακιτικόν, φυλακιτικον ἀμπελώνων, and φυλακιτικὸν ἐργαστηρίων καὶ ἑθνῶν.
130 Reden, *Money in Ptolemaic Egypt*, 93.


12 γεωμετρικὸν is clearly written on the papyrus, but γεωμετρίας, the land tax or the land-survey tax, is expected since it is occasionally recorded in conjunction with other taxes paid in cash.\textsuperscript{131} The adjective in this location can perhaps be explained by rendering the tax name with the neuter noun ἐκφορίον as occurs in \textit{P.Hib.} 1 90.8.\textsuperscript{132} The only other occurrence of γεωμετρικός in the papyri is in a private letter mentioning a geometrical problem.\textsuperscript{133}

13 ἁλικῆς, the salt tax, is a well-documented tax paid in money,\textsuperscript{134} known from copious receipts mainly from the mid-third century BCE (255-231).\textsuperscript{135} The salt tax receipts are very common, including at least 103 identified from Thebes alone,\textsuperscript{136} and it was a tax levied on every man and woman. The clear portion of the word, ἁλικῆς, could theoretically also be the end of βασιλικῆς, but two lines of reasoning make this unlikely. First, a small dot of ink attached to the lambda indicates that a letter with a tail towards the bottom right, like an alpha precedes the lambda, and not an iota, which, in this hand, is always straight and detached from the surrounding letters. The other line of reasoning is that, while there are taxes such as the βασιλικόν, σῖτος βασιλικός, and φόρος βασιλικῶν, they would not decline to ἡς. \textsuperscript{137}

δῶ (διώβολον) is 4 obols, the price paid for the salt tax. From financial year 5 of Ptolemy III, some men paid 4 obols.\textsuperscript{137}

\textsuperscript{131} This tax is mentioned in many documents, often from the Roman era, such as \textit{BGU} 2 572.7, 10, 15; 573.6; 574.8, 12; and 1896.356. In the Ptolemaic era, the land survey tax was mentioned relatively infrequently: \textit{P.Tebt.} 1 93. 8, 14, 114/113 BCE is one of the few clear examples paid in cash, and it may not always have been paid in cash (\textit{P.Tebt.} 3 1013.3, second century BCE).

\textsuperscript{132} γεωμετρίας ἐκφορίου.

\textsuperscript{133} \textit{SB} 3 7268.1.

\textsuperscript{134} There are more than 100 examples from the second century, including: \textit{BGU} 6 1333.2; \textit{P.Count} 30.1, 3; \textit{O.Bodl.} 1 14.1; \textit{O.Wilck} 1227.1; \textit{P.Bagnall} 19.3; \textit{P.Hib.} 112.3; \textit{SB} 10 10508.2.

\textsuperscript{135} An exception is \textit{P.Petaus} 42, 184-186 CE.


\textsuperscript{137} Muhs, \textit{Tax Receipts, Taxpayers, and Taxes}, 42.
14 Three symbols near the end of this line appear as follows: ـ ــ. It is not common for receipts to end with a summation of the expenses paid, or calculations of amounts remaining to be paid, but this appears to be the case in this document.\footnote{Calculations and summations are more common after the third century BCE: \textit{BGU} 1 63.8 (199-200 CE); 6 1232 II.25 (110 BCE); 1314.5-6 (102 BCE); \textit{O.Bodl.} 1 134.8 (136-5 BCE); \textit{O.Erem.} 4.4 (88 CE).}

Conclusively identifying the precise meaning of the hasty scribbles has proven impossible. Some suggestions are: χωπόν, χωπαί for the remaining amount owed; περίεστιν also indicating the remaining amount owed, as in \textit{O. Deiss.} 61; γίνοντα αἴ προκείμενα indicating that all the tallies equal the above-written total, since both the 12 and a half drachmas and the 19 drachmas appear at the top of the papyrus, but this is not an attested phrase in the 3\textsuperscript{rd} century BCE; and ἀφ' ὡν ἀνηλώματα, indicating that the expenses are deducted from some larger total that is not present on the preserved portion of the papyrus. It is clear that multiple totals are referred to in this receipt (12 and a half drachmas and 19 drachmas) and I believe that the first is the total paid, and that 19 drachmas is the amount still owed. This interpretation would require a calculation and statement of the remainder, which preferences the idea that the last two strokes are a lambda followed by an abbreviation stroke: λ(οιπαί).

The first symbol (ـ), however, is still unexplained. This could be a number of things: if the symbol is supposed to appear as ـ, then it could mean τάλαντον, an impossibly large amount in this context, or, as identified in \textit{P. Grenf.} II 65.1, half a chalkus, but this is a rather doubtful reading. It could also be a misshapen symbol for διώβολον, although the blank space between it and the symbol for triobol is unexpected.\footnote{\textit{P. Cair. Zen.} 59206.40 has a symbol for διώβολον that appears similar to what is written here.} Alternatively, if there is ink between the top and bottom line that has faded, then it could mean τέταρτον (a quarter of an obol, which is two chalkoi), as in \textit{P. Cairo Zen.} I 59013.5, or it could be a strange zeta, which could be an abbreviation for ζεύγη. “Talant” and “pairs” are discarded as nonsensical in the
context, and half a chalkus as a very dubious interpretation of the symbol. τέταρτον or διώβολον makes the most sense, since the amount of drachmas and obols has just been presented and certain taxes during this time period were minor enough to be paid with coppers, such as the unnamed tax of two and a quarter obols throughout CPR 28 5. Although this as the most logical interpretation, I hesitate to endorse it (thus the reading above has been left uncertain) because there is a significant gap between the symbol and the notation of the drachmas, while it is grouped closely with the symbol interpreted as λ(οιπαί). The evident use of spaces between words in this text strongly suggests that this symbol belongs with the ones interpreted as λ(οιπαί) instead of the monetary figures. Interpreting the symbol as τέταρτον would additionally require mistaken reckoning in comparison with the top of the page where the amounts were initially laid out as twelve and a half drachmas and 19, which is otherwise exactly repeated at the bottom of the sheet. There is also no mention of a quarter of an obol in the surviving part of the papyrus.

Comments on OUG Inv. 121 Fragment 1

A remarkably good parallel is P.Hib. 1 104, a duplicate tax receipt for the 22 year of Ptolemy III that begins with a short date, the statement that Eupolis has (ἔχει) the taxes from (παρά) Diodoros for the 22nd year, then the taxes and the payment amounts are listed with multiple entries on each line. The entire receipt is written again below with a space separating the entries. Likewise, OUG Inv. 121 fr. 1 has some duplication between the top and the bottom after a gap, and it also lists taxes and amounts in the same way in the second part of the document. Differences include that OUG Inv. 121 fr. 1 clearly is not a simple duplicate receipt because the top portion does not contain a copy of the bottom (only 3 lines appear at the top of the papyrus), there is a longer passage describing the transfer of the money with space for the
names of three separate individuals (lines five and six) and the last line includes a calculation, which sometimes occurs in other receipts, particularly after the first century CE,\textsuperscript{140} but is much more common in accounts.\textsuperscript{141} Overall, I conclude that this document is a receipt from the formal format of the date, the detailed description of the transfer of money, and the list format for the payments rather than columns, which are common in accounts.

The one tax for which this receipt shows both the tax name and the amount paid is the salt tax. The salt tax was introduced in 263 BCE, and was levied on everyone. Initially individual receipts were issued for this tax, but from Ptolemy III onwards, the salt tax was often collected in conjunction with other taxes paid in cash and the receipts often combine them, as in this case.\textsuperscript{142} The level of the tax was relatively fixed and men paid more than women, while slaves paid less than women. The price of the tax also decreased over time, and beginning from fiscal year 5 of Ptolemy III, some men paid 4 obols,\textsuperscript{143} as in this receipt, which is also supporting evidence for the date April/May 233 BCE.

Fragment 2 from the same folder can be conclusively dated to the reign of Ptolemy III. Since papyri separated at the same time from the same cartonnage were initially stored together, this is strong evidence for a similar date for fragment 1. The earlier possible date, 233 BCE, is much more likely to be correct.

\begin{flushleft}
\textsuperscript{140} Examples: BGU 1 63.8 (199-200 CE); 6 1232 II.25 (110 BCE); 1314.5-6 (102 BCE); O.Bodl. 1 134.8 (136-5 BCE); O.Erem. 4.4 (88 CE).
\textsuperscript{141} Such as P.Cair.Zen. 2 59176; P.Tebt. 3 1022.
\textsuperscript{142} Muhs, Tax Receipts, Taxpayers, and Taxes, 41.
\textsuperscript{143} Préaux, L’Économie Royale, 251; Muhs, Tax Receipts, Taxpayers, and Taxes, 42: in Thebes “the rates of the salt tax appear to have decreased through time. From Egyptian year 22 of Ptolemy II through fiscal year 31 of Ptolemy II the salt tax appears to have been levied at ¾ kite (1 dr. 3 ob.) annually for men... in fiscal year 5 of Ptolemy III the salt tax appears to have been lowered for some people to 1/3 kite (4 ob.) annually for men...”
\end{flushleft}
OUG Inv. 121 Fragment 2: A Dating Formula

Oxyrhynchites or Herakleopolites 8.7 x 9.6 cm 246 to 221 BCE

This fragment has turned a very dark brown, and is more than half covered with gesso and gesso residue, as described in section 6.4 on the benefits of NIR photography. Two lines written against the fibres are partially preserved, and very faint traces of four more lines can be seen in the NIR photograph. The back is blank and without traces of gesso.

The hand is awkward, with letters of variable sizes and the lines slant upwards towards the right. The top margin is 1.0 cm and the left margin is 0.7 cm; the right and bottom of the papyrus are torn away at an angle. Several significant holes occur in the middle of the fragment.

fr. 2, front

1 βασιλεύοντος Πτολεμαίου τ[σού Πτολεμαίου καὶ Αρσινό-]

2 ης θεῶν Ἀδελφῶν [ ἔτους?

traces of four more lines

Translation

In the [year ? month? date?] in the reign of Ptolemy the son of Ptolemy and Arsinoe the brother-sister gods...

1 [σοῦ Πτολεμαίου καὶ Αρσινό-] can be filled in from the parallels for this dating formula, such as P.Col. 4 85 and P.Hib. 1 91.144 The reign must be that of Ptolemy III Euergetes, January 246 - February 221 BCE.145

2 [ ἔτους? The year, ἔτους, possibly written as the symbol L, and the month and day number surely followed.

144 Direct parallels include: BGU 10 1920.1-2; 1929.1-2; Chr.Wilck. 410.1-2; P.Bodl. 1 58.14-15; P.Eleph. 23.4-5; P.Genova 3 114.1-2; P.Hamb. 2 171.1-2; P.Petr. 3 124 A.1-2.
7.2. *OUG Uncatalogued 61*

The accession number OUG Uncatalogued 61 currently refers to 33 fragments (including some small scraps) separated into five distinct groups stored in separate leaves of Oxford University Gazette newsprint. The papyri presented here are fragments 1 and 2; fragment 1 is the largest fragment and it is stored in page 177 of the newspaper along with 11 other very small fragments. Fragment 2 is the only one of the 11 other fragments that displays the large rounded uncial present on the front of fragment 1. A second crabbed hand features on the back of fragment 1, but it does not appear on the other fragments. A few notes are stored in this folder alongside the papyri, including a partial transcription of fragment 1, which agrees with this reading in most places. The NIR photograph has expanded the range of legibility to the top five lines on the front, and several letters and two partial lines on the back.

**Fragment 1:** List of Names and Payments

Oxyrhynchites or Herakleopolites?  
19.5 x 8.1 cm  
III century BCE

The papyrus is pale brown on the front and a thin layer of gesso covers the majority of it. The front has 14 lines written along the fibers, with another three lines added between the original entries, all of which are written in a large, rounded, fully-detached uncial. The palaeography indicates the early- or mid-third century BCE, but the style is not distinct enough to rule out a later date. A stiff four stroke sigma is used to represent numbers, but the lunate sigma is present in the names,\(^{146}\) the mu shows a relatively shallow dip between vertical uprights, and the eta has a horizontal cross-bar between two entirely vertical strokes.

The top of the papyrus is quite damaged, and the gesso makes it almost impossible to see any ink for the first five lines in VIS, but the NIR photograph reveals several distinct letters and

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\(^{146}\) As in *CPR* 28 3, and 6, and throughout the Zenon archive, such as *P.Cair.Zen.* 4 59769.9, but in these cases the lines of the sigma are slightly curved; the sigmas in OUG UNC 61 fr. 1 are completely straight.
many more traces. The right margin is torn away, and the top quarter of the document is missing. The bottom line of the document, however, seems to be completely preserved; indeed, the last letter appears squished as if the writer attempted to fit it on the line. The bottom and left margins are preserved. The top is straight and is most likely the margin, but severe damage in this region make it impossible to be certain. If this is the original top margin, then the dimensions 19.5 by 8.1 cm represent the size of the complete papyrus. Additionally, if this is the top, the document lacks a heading explaining the entries in the list.

The back of the papyrus has a second hand with seven lines written against the fibers. The lines are not quite straight and the letters are irregular in height, indicating a hurried or less practiced hand than the front. The ink is entirely stripped away at many places, and, combined with a difficult to read hand, the lines are quite unclear. Characteristic of the second hand is that most of the letters have strokes that hang below the line. Additionally, the nu is narrow and consists almost entirely of a vertical stroke, the sigma used for the number 200 has three lines that are in the shape of the left side of a rectangle, the upsilon has no curve on its down-stroke, and the omega has very shallow cavities. Nonetheless, it may be a continuation of or notations about the same list as the front since the value of the payments is mostly within the same range (generally sigma, 200).

fr. 1, front
(first hand)

1 Ἀριστα[]
2 ...,[...],[
3 Κλεαρχ[ος

---

147 The sigma on the back of the document is similar to first century BCE numeric sigmas such as those in BGU 16 2670 Fr.A2.2 (14-13 BCE) and 2671.7 (21-5 BCE). The hand on the back appears hurried, which could produce this appearance.
4 Αντι[ 
5 ...ξ[ 
6 Θωτ[ 
7 Δέξιος [ 
7a π[ 
8 Πτολεμ[ 
9 Νικιάδης[ 
10 Φρυνίχ[ος 
10a Ἰσεω[ 
11 Λεω[...]πως σ[ 
11a Φαιξνα Ἀπαθ[ου? 
12 Νικάνωρ σ[ 
13 Μοσχίων σ 
14 Απολλώνιος το(...?) σν[ 

fr. 1, back 
(second hand) 
15-18 traces 
19 [...]αταρο[...] γ[ 
20 Ψά[...]του σ Λεπιδ[ 
21 νο... σ Ἱερώνυμος
Translation

Front

Arista[?] ... (illegible name) ... Klear[os] ... Anti[?] ... (illegible name) ... Thiot[?] ... 

Dexios ... P[?] ... Ptolem[?] ... Nikaiad[s] ... Phrynich[os] ... Iseo[?] ... Leo[...]poas 200?; 

Phaixna Apa[?] ...; Nikanor 200?; Moschion 200; Apollonios the toparch? 250.

Back

Jataro[? (the middle of a name)]13?; Psais [?]toui 200; Lepid[os?] ... (unclear) 200; 

Hieronumos

Front

3 Κλέαρχος is the only attested name that suits the ink traces. It is already attested in 
the third century BCE,¹⁴⁸ and through to at least the seventh century CE.¹⁴⁹ 

6 Θωταρος is a not previously attested combination of letters for a name. Θίων and 
Θιώδορος were initially possibilities, but the ink present on the papyrus strongly indicates a τ 
at the fourth position. This may be an otherwise unattested spelling mistake or variant for 
Θιώδορος or Θεωτάριον.

7 Δέξιος is a rather infrequently attested name, but it does occur in the third century 
BCE (SB 24 16272.431). This name is given in the nominative, and presumably the entire list 
is in the same case.

9 Νικιάδης is an uncommonly attested name; O.Bodl. 1 250.2 and BGU 10 1939 are 
the only relatively certain examples, both of which occur in the second century BCE.

¹⁴⁸ BGU 14 2397.3, 18; P.Lond. 7 2014.4; P.Petr. 2 4.1; P.Ryl. 4 576.1-2.
¹⁴⁹ SB 24 16016.7.
10 Φρυνίχος may be attested three times between 230 and 191 BCE, but only once with complete certainly in BGU 6 1274. Given the scarcity of the record, it is difficult to assess the geographical distribution of the name, but the two are from Takona in the Oxyrhynchites (upstream from El Hibeh), and one from either the Oxyrhynchites or Herakleopolites. This suggests that one or a few related individuals with this name lived in the region.

10a Ισκ/Ἰσκ is an uncertain reading which could be the name Ἰσεως or Ἰσεῶς.

11 Λεω is a puzzling line; Λεόντιππος is the only plausible name beginning Λεω or Λεω and has a π. It is possible that two names are written on this line, Λέων and Ποας, but we would expect a patronym in the genitive, and the ending -ποας is not the expected genitive ending for these names.

11a Φαιξνα must be interpreted as a name and the reading φαιξνα is quite clear, but there are no attested names beginning in this way. The note in the folder suggests ἀπαιδευτος after the name, presumably as a descriptor, ἀπαιδέωντος, but there is no delta, and the traces after the last alpha do not appear to be an iota since the ink extends laterally at the top, middle, and bottom—perhaps a θ, which could be Ἀπαθ as the beginning of Ἀπάθης, a Greek rendering of a well-attested Egyptian name. The name may be abbreviated to Ἀπάθ as in P.Princ. 1 8.20 and many ostraka, but the break in the papyrus makes it impossible to tell.

14 το(πάρχης) the abbreviation for toparch is usually τοπ(), but το() is attested in P.Oxy. 55 3778 from the first century CE. Alternatively, it could be an abbreviation for a patronym. The most common third to first century BCE abbreviations for το are τό(πος) and το(παρχία), which do not make sense in the context.

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150 BGU 6 1274.19; 14 2388.14; P.Count 47.92.
151 O.Lund. 23.12 from the third or fourth century CE.
19. [. . ] αταρο[. .] is the middle of a name, possibly Ἀσκλατάρον or Παταροῦς.

The character y is unexpected from the pattern of the other numbers. It is possible that the bottom portion of a σ has been effaced, making it appear to be a γ and that the τ should be interpreted as part of the name, but since the back of the document is clearly a hastier note and does not follow the formal pattern of the front, different numbers are, of course, possible.

20. του could be the part of a name, Ετου is attested from the third century BCE,\footnote{P.Cair.Zen. 1 59004.9 (c. 259 BCE).} and from the Roman and Byzantine eras there are Ατου and Τατου,\footnote{Ατου in P.Louvre 1 53.16 (third century CE); Τατου in P.Lond. 4 1421.51 (705 CE); and P.Lond. 4 1554. 24 (eighth century CE).} but the traces fit none of these spellings very well, although Ετου is the most similar.

21 νο. should be either the end of the name beginning Λέπι- or a very short patronym or abbreviation, such as νοµ(άρχης).\footnote{The abbreviation νοµ() is, however, extremely rare before the common era, and when it appears it usually resolves as νοµ(ίσµατος); νοµ(άρχου) does appear in O.Joach. 5.4 from 74 BCE.}

**Fragment 2:** Fragment of List of Names and Payments?

3.7 x 4.4 cm

fr. 2, front

(first hand)

1 ] σ

2 ] ρ, [ ]

3 ] ας σν

4 ] ρν το κε

The back is blank.

Translation

\footnote{153} P.Cair.Zen. 1 59004.9 (c. 259 BCE). 
\footnote{154} P.Louvre 1 53.16 (third century CE); Τατου in P.Lond. 4 1421.51 (705 CE); and P.Lond. 4 1554. 24 (eighth century CE). 
\footnote{155} The abbreviation νοµ() is, however, extremely rare before the common era, and when it appears it usually resolves as νοµ(ίσµατος); νοµ(άρχου) does appear in O.Joach. 5.4 from 74 BCE.
... 200; ... 150?; ... (name ending “as”) 250; ...150, the 25th

1 \sigma appears at the end of a line, and further to the right than the ends of lines two and three. The sigma is in the same style as those of fragment 1, and appears to be a payment.

2 \rho is a number, but only one slight trace of ink in a downward stroke remains of the next letter, which could be \iota, \kappa, \mu, \nu or \pi.

3 \alpha is a fairly common nominative end for names. Unfortunately, it is not identifiable enough to attach this line to the fragment 1.

\sigma also occurs on fragment 1, line 14.

4 \rho follows the pattern of the other numbers at 50 unit intervals.

\tau appears in the margin farther to the right than the other letters. The line above the \kappa is very clear, and does not appear above the other numbers. This can be interpreted as a date, most likely a month day rather than a year.\textsuperscript{156}

Comments on OUG Unc. 61 Fragments 1 and 2

There are many examples of lists of names on papyrus and ostraka,\textsuperscript{157} of which the purpose is sometimes clear,\textsuperscript{158} but insufficient context for interpretation is also common.\textsuperscript{159} In this case, the list of names is correlated with an amount, which could represent amounts of goods or money transferred for taxation, business or banking purposes, or the area of land holdings. In this case, the nature of the figures is not identified, but they are very high for simple goods or peasant expenses, and quite possibly represent land measured in arouras, goods that are produced

\textsuperscript{156} P.Col. 4 77 verso and P.Wisc. 1 25 are examples of this, although the day numbers are written to the left.\textsuperscript{157} Some Ptolemaic examples are: BGU 6 1474; O.Ashm.Shelit. 58; P.Bingen 42.\textsuperscript{158} BGU 7 1556, a list of people who received amounts grain; SB 18 13214, a list of people who received keramia from a storehouse; P.Cair.Zen. 1 59006, an account listing people who bought or received pickled fish; P.Cair.Zen. 2 59293, an account of barley issued to various people over three years; P.Count 52 R DAHT 5436 = P.Tebt. 3 881, a list of tax-payers in a Greek household; SB III 7222, list of people with amounts of taxes owed in arrears.\textsuperscript{159} BGU 10 1988; O.Deiss. 70.
and transferred in large quantities, such as artabas of grain, or money from relatively rich people.\textsuperscript{160} It is notable that not every payment is the same, but the variation usually follows, as far as can be identified from the clear numbers, a pattern of 50 unit increments.\textsuperscript{161}

The interlinear additions 7a, 10a and 11a also demand explanation. The simplest is that the writer forgot to write an entry, perhaps forgot some names, and added them in between, but the list is not in alphabetical order so forgotten names could have simply been added to the bottom. Another organizing principle, such as by date, could explain the additions, but this seems unlikely. The most likely supposition is that the added words, which do seem to be names despite some uncertainty, are related to the names on the main lines, such as relatives or further identifiers.

It is notable that most of the names are Greek,\textsuperscript{162} which could be the case because it deals with richer people or people of a certain eligibility group, such as cleruchs. Greek settlers, cleruchs or business people, for example, could be making large deposits to the bank, paying certain taxes/fees in kind rather than cash, or their land holdings could be listed. The lack of a header or other context makes it impossible to determine.

Information that can be derived from name-lists regardless of whether the context is fully known include attestations of names in locations or time-periods for which they were not previously known, attestations of variant spellings, and if the reading is certain, the identification of previously unknown names. In this document, we find Φαιξνα as a previously unattested name. Additionally, Φρυνίχος is a relatively rare name linked to an area south of Ankyron Polis.

\textsuperscript{160} Some examples of lists with figures in the hundreds are: \textit{P.Cair.Zen.} 3 59325, an agricultural account c. 259 BCE; \textit{P.Hib.} 1 118, an account of olyra; \textit{P. Tebt.} 1 72, a report on crops and a land register; \textit{P.Tebt.} 3 887, an account of an oil merchant; \textit{P.Tebt.} 3 1068, an account of money.
\textsuperscript{161} Fr. 1 lines 13 (200), 14 (250), 20 (200), 21 (200); fr. 2 lines 1 (200), 3 (250) and 4 (150).
\textsuperscript{162} (Front) Arista[, Klear[os, Antü[, Thiot[, Dextos, Ptolem[, Nikaiade[os, Phrynich[os, Iseo[, Leo[, Nikanor, Moschion, Apollonios (Back) Lepid[os?, and Hieronimos. The non-Greek names are Phaixna (Φαιξνα) and Psais ?tou (Ψαις [tou).
by two papyri from Takona in the Oxyrhynchites\textsuperscript{163} and a papyrus from the Oxyrhynchites or Herakleopolites.\textsuperscript{164} This evidence supports the already known source of the Hibeh papyri: the southern Herakleopolites or the northern Oxyrhynchites.\textsuperscript{165}

7.3. Miscellaneous 6 (RW Inv. 14A)

List of names for tax collection in arrears

Provenance unknown 17.6 x 9.1 cm July/August 245 [or 244] BCE

Miscellaneous (Misc.) 6 is one of several papyri that have lost their accession numbers, but it has been tentatively identified as RW Inv. 14A, which would make it an unpublished Hibeh papyrus. That it is from cartonnage, as most of the Hibeh material is, and the front has been thoroughly cleaned and the two fragments have been joined by a restorer support the identification of the RW Inventory. RW Inventory, however, all arrived at the University of Toronto in frames, and there is no evidence (notes or otherwise) that this fragment was stored in a glass frame. Additionally, some of the PT Inventory also share these characteristics.

The front of Misc. 6 is pale brown with numerous holes, several small red stains and a kollesis running vertically 1.9 cm from the preserved left edge. Two fragments have been re-joined by a restorer, but whether the fragments were originally joined when the papyrus was acquired, and then broke and were restored is unclear. The join is entirely plausible and will be accepted for the purposes of this paper, despite the fact that ink only crosses the break at two points. The writing appears in two columns, but column 1 consists of only a few characters in only three scattered lines. Column 2 has 15 lines written along the fibers, which are well-preserved except for the bottom four lines where much of the ink has been washed away (figure

\textsuperscript{163} BGU 6 1274.19; 14 2388.14.
\textsuperscript{164} P.Count 47.92.
\textsuperscript{165} Grenfell and Hunt, introduction to The Hibeh Papyri: Part I, 12; Falivene, The Heracleopolite Nome, 12: the Hibeh papyri “reference... villages of the southern Heracleopolites (or of the northern Oxyrhynchites).”
15). Line spacing is large and occasionally irregular, with most lines occupying 0.9 cm, but some are 1.4 cm. The letters are consistently about 0.3 cm in height. The top margin is preserved, although mangled, for a width of 2.2 cm, but no other margins survive.

The hand in column 2 is a practiced and neat uncial that incorporates sharp corners and smooth curves. Serifs are present on some letters, always on the upsilons, but also some taus, chis and kappas. The hand also displays a round single stroke lunate sigma, a strong curve on the second vertical of the pi, a steep angle on the crossbar of the alpha, a stiff, upright upsilon with three distinct lines, a two stroke lunate epsilon, and a fully round omicron slightly smaller than the other letters. The hand is not cursive, although occasionally the writing appears hurried, with adjacent letters joined. The writing has the appearance of Ptolemaic bookhand very similar to the following examples: *P.Hamb. 2.163*, a fragment of Thucydides (c. 250 BCE); *PSI 6.65*, a letter possibly sent to Zenon (mid-third century BCE); *P.Petrie 1.25 1*, a fragment of Alkidamas’ *Museion* (third century BCE); and *P.Sorb. inv. 2303*, a fragment of the *Iliad* (third century BCE). The internal evidence for a date in the third (financial) year of Ptolemy III Euergetes (245 BCE) confirms the palaeographical evidence.

The provenance is unknown, but if this papyrus is from El Hibeh it is most likely from the Heracleopolites or the Oxyrhynchites. Column 2 line 8 mentions a village name beginning Τοχν, which could be Tochnoubis. A village called Tochnoubis existed in the Hermopolite nome and is known from papyri from the second to the eighth centuries CE.\(^{167}\)

\[1\delta\]


\(^{167}\) *P.Aberdeen 156.5* (second century CE); *P.Sijp. 30.124* (second century CE); *P.Ahm. 2 71.12* (178-9 CE); *Stud.Pal. 5 38.6* (third century CE); *Stud.Pal. 20 83*, col. 3.1 (third or fourth century CE); *P.Ahm. 2 122* (211-2 CE); *P. Ryl. 2 206.13*, 18 (late third century CE); *P.CairoPreis. 20.7*, 15, 65 (356-7 CE); *P.Lond. 3.3* (after 385 CE); *P.Sorb. 2 69*, col. 60 D.8 (633-4? CE); *Stud.Pal. 10 222.1* (eighth century CE).
Translation

(xvacat)

2 (ὀβολός)

2-3 (ἡμισύ?)

3 η (ὀβολός)

2 – 3 – 2-3 2

col. 2

4 ) ἔτος γ Παῦ[νι

5 Ὄρος Αχομνεύιος εν[ -? - λελο

6 γευκέναι ἀπὸ τιμης οἰ. [

7 τοῦ λό (ἔτους) καὶ δ[,]δω [.]

8 κόμης Τοχν[ούβε(ως)?] δ [.]

9 / Σαμὼς Αρ[

10 [.],]ρως Πα[

11 / Μίσις Π.,[

12 / [.], εως Αρυω[.

13 / Ονκέλυ[.

14 / Σαμώς Μίκρος Σαμώ[τος

15 Χ Νεχθεύτις Φαβήτος [

16 Χ Ἀχμᾶς Άμωτος [

17 ], α[τ[.

18 ]τ[.

------------------

Translation
col. 1

1. one-quarter (obol)
2. ... one obol
3. 2-3 half?
4. ... eight (drachmas) and one obol

col. 2

4. Year 3 Pau[ni
5. Horos Achronneuios
6. collected from the price of w[ine?
7. for the 39th year and ...

8. the village of Tochnoubis? ..
9. Samous the son of Ar[
10. Arous the son of Pa[
11. Miusis the son of P[
12. [?]eos the son of Aruo[
13. Orkelu[
14. Samous Mikros the son of Samous
15. Nechtheutis the son of Phabes
16. Achmaris the son of Amos

two lines too fragmentary to translate
Col. 1

1 δι' appears very similar to that in P.Cair.Zen. 3 59366v, where it is used instead of the often ligatured abbreviation τε for one-quarter of an obol. A 2.9 cm gap occurs between this line and the next. The left column appears to have about 0.5 cm per line, and so perhaps five or six lines are missing.

2-3 (ἡμισυ?) a large two line symbol (〈 〉) could mean ‘half.’ It is unlikely that it corresponds directly to the monetary figures in the left column. The position is directly in the middle of the margin, crossing the kollesis, and beside the names in column 2 that have x-marks beside them, rather than long diagonal check marks. This symbol could indicate that the x-marked individuals in column 2 only paid half of their tax dues. Alternatively, the symbol could specify the units of measurement used in column 1. The possibilities for this are: a slightly misshaped or exaggerated symbol for drachmas (‹), metretes (亹), or artabas of wheat (♩, which derives from the earlier forms ♩ and ♪).168

Col. 2

4 ἕτοιμη Παῦνι: the first word is set off to the left of the main column, perhaps due to its function as a column header. The date is in Pauni (July/August) of the third year, and the reign is identifiable from the year that the taxes are owed in arrears (the 39th year, line 4).

The 39th year must be the last year of Philadelphus’ reign, so ἕτοιμη is the third (most likely financial) year of Euergetes. The only possible dates are: July/August, 245 BCE (the third financial year) and, less likely, July/August, 244 BCE (the third civil calendar year).

5 Ὄρος Ἀχομνεύιος is a name also found in P.Köln 10.411, fr. C,1.19 (a list of wheat taxes) 178 BCE. These are both Egyptian names: Ὄρος is exceedingly common, and occurs

over six thousand times in Greek papyri and thousands of times in demotic papyri, while Ἀχοµνεύιος occurs 11 times in Greek papyri, mostly in the Arsinoite nome and almost exclusively from the third or second century BCE.169 This name is placed in the heading section, and most likely represents the name of the tax collector (usually identified as a λογευτής although this is not present in this document) or an official in charge of registering the list. The most common format is similar to that of P.Tebt. 3 877: [ἐτοὺς λθσκ/Ibσωwpv/EbgP/έ Φαῶφι. παρ᾽ Ἀµµωνίου λογευτοῦ τῆς | [Πολέµω]γος μερίδος ; the name of the tax collector follows directly after the year and is in the genitive after παρὰ. In this document, Ὡρος Ἀχοµνεύος appears in the nominative, which results from the active construction with the infinitive of ἐπιλογεύω; the main verb is missing.

5-6 λέλογευκέναι is a perfect active infinitive ending and it is conclusively that of a λογεύω verb. ἐπιλελογευκέναι is a possibility, but the scarcity of parallels makes it less likely, despite that it is contextually highly relevant because ἐπιλογεύω means to collect taxes in arrears. ἐπιλογεύω and its stem λογεύω are, in fact, not commonly used in the papyri: both forms appear more often as participles and ἐπιλογεύω itself only occurs five times in two separate documents.170 Where λογεύω does occur, it is distinctively Ptolemaic and usually relates to tax collection and ἐπιλογεύω always refers to tax collection.

ἀπὸ τιµῆς is a common phrase used to indicate the source of money, “from the price/value/sale of...”171 In this case, the traces following ἀπὸ τιµῆς could be οἶνου, which

\[\text{\textsuperscript{169} CPR 17B 12.3 (217-8 CE); CPR 28 8.33-4 (225-126 BCE); CPR 28 9.13 (225-126 BCE); P.Bingen 27.10 (211-204 BCE); P.Cair.Zen. 4 59656.10 (256-248 BCE); P.Köl 10 411.C1.19 (178 BCE); P.Petr. 2.4.12 (275-226 BCE); P.Tebt. 3 890.24 (200-176 BCE); P.Zen.Pestm. 63.28 (third century BCE); SB 16 12342.10 (239 BCE); and SB 16 12344 (236 BCE).}\]

\[\text{\textsuperscript{170} In 57 uses of either form, just over half (19) are participles, and a significant minority (8) are in the infinitive form. There are only five published instances of ἐπιλογεύω in two separate documents, P.Petr. 3 109 and P.Rev. Laws.}\]

\[\text{\textsuperscript{171} As in the letter P.Ryl. 2.141.21-2: ἀς εἶχον ἀπὸ τιµῆς ὁ ὕπιον ἄργυρον (ὑπὸ τιµῆς ὁ ὕπιον ἄργυρον) (δραχµὰς) μ; translated as “40 silver drachmae which I had with me from the sale of opium.”}\]
implicates taxation on wine or vineyards. The tax list *P.Hels.* 1 26.17 (second century BCE) specifies in one instance the item taxed (ἀπὸ τιμῆς κριθῆς), and in tax lists for vineyards, the income from wine is specified in this way, such as in *P.Petr.* 3 117 (g) col. II.5-6, ἀπὸ τιμῆς ὀἴνου [τοῦ αὐτοῦ] | ἀμ(πελῶνος). ἀπὸ τιμῆς also occurs in some tax receipts, such as *O.Strasb.* 1 15.3, ἀπὸ τιμῆς ὀθονίω(ν) βασιλικῶν τοῦ λα (ἔτους).

7 τοῦ λθ (ἔτους) is the usual phrase for indicating the year for which taxes are being collected. This construction appears both for taxes collected for the current year and very commonly for taxes in arrears. The 39th year must be the last year of Philadelphus’ reign, which, according to the financial calendar, would only have been two years before year three of Euergetes. Ptolemy I Sotor is ruled out, even though he governed for 41 years, because his dates are usually reckoned from the time that he was pharaoh rather than satrap; his thirty-ninth year is actually referred to as year 20. Ptolemy VIII Euergetes II has dates for the thirty-ninth year because dating was continuous from Ptolemy VI Philometor through to the end of his reign, but this date is very unlikely not only because of significant evidence indicating the third century BCE (names and palaeography), but because so many individuals owing taxes in the third year (c. 114 BCE) for the thirty-ninth (131 BCE) is unlikely given the 17 year time lapse.

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172 Other tax lists that uses the phrase are *P.Paramone* 8.30 (second century BCE) and *SB* 22 15824.9 (fourth century CE). *P.Ryl.* 4 573.2 (third century BCE) is a letter requesting further tax payment ἀπὸ τιμῆς ὀἴνου.

173 Tax receipts that use the phrase ἀπὸ τιμῆς for specifying the item taxed include: *P.Fay.* 47 Z.1-14 (first century CE) on beer; and *PSI* 3 181.4 (first century CE) also on beer.

174 *O.Bodl.* 1 35.2-3, (ἔτους) β ἐπέρρε ἥ σπέτσοικεν | εἰς τὸ ... κον τοῦ β (ἔτους) ἀπολλόνιος; *P.Petr.* 3 115.3 (mid- to late third century BCE) specifies the tax on papyrus directly before the year for which it was paid, χαρτηρὰν τοῦ η (ἔτους).

175 *P.Petr.* 3 112, taxes for two years, the current and the previous years, are specified throughout, τοῦ β (ἔτους) and τοῦ κς (ἔτους); *P.Tebt.* 3 1061, an account of tax payments, mentions payments for the thirteenth, fourteenth, fifteenth, sixteenth, eighteenth and nineteenth years in this format.

176 Financial year one lasted not even two months because Euergetes succeeded in Choiak, the second month before Mecheir.
A short guide line or section indicator (paragraphos) appears under the beginning of this line. It is possible that the list was drawn up for multiple locations and that this column is for one village (Τοχνούβις?).

8 κόμης Τοχνούβε(ως)?] the letters τοχν are very clear, and this configuration occurs only in two Egyptian village names: Τερτονπετοχνούβις and Τοχνούβις, both in the Hermopolites. It is also possible that such a configuration could be found in an Egyptian personal name, such as a variant of Πετεχνούμις, but the presence of κόμης before τοχν strongly indicates the village Τοχνούβις. The 1.3 cm lacuna allows for 4 to 5 letters, which means that the word Τοχνούβεως is too long (it would require approximately 1.7 cm). The common abbreviation Τοχνούβε for Τοχνούβεως fits with some space to spare. The mention of this village is significant as evidence for the provenance of this document, but it must be recognized that there is no additional confirmation that τοχν actually refers to the Τοχνούβις in the Hermopolites, nonetheless no other village names beginning this way have yet been identified. Additionally, the village Tochnoubis has never been mentioned in Ptolemaic times, but since the village name is Egyptian there is the distinct likelihood that it existed earlier than the Greek documentary papyri currently indicate.177

9 / Σαµῶυς Αρ[ begins the list, which is not in alphabetical order. Almost every name has a check mark to its left, such as in P.Tebt. 4 1138.178 In this list there are two types of marks next to the names, the angled line and the x-shape, and at least one name does not have a mark. It is likely that these marks were used to refer to the payment or notification status of

177 P.Aberdeen 156.5 (second century CE); P.Sijp. 30.124 (second century CE); P.Ahm. 2 71.12 (178-9 CE); Stud.Pal. 5 38.6 (third century CE); Stud.Pal. 20 83, col. 3.1 (third or fourth century CE); P.Amh. 2 122 (211-2 CE); P. Ryl. 2 206.13, 18 (late third century CE); P.CairoPreis. 20.7, 15, 65 (356-7 CE); P.Lond. 3.3 (after 385 CE); P.Sorb. 2 69, col. 60 D.8 (633-4? CE); Stud.Pal. 10 222.1 (eighth century CE).
178 Many examples relate to taxation, some of which are: SB 24 16272; CPR 5 26; P.Mich. 4 223 (Tax Roll from Karanis); P.Vindob.Sal. 17; P.Tebt. 4 1112; P.Tebt. 4 1141; P.Tebt. 4 1143; P.Tebt. 4 1147.
the individuals: indeed, if the symbol between the two columns next to the x-marks refers to these, then the names with the x next to them may have paid half of their dues, the names with the check-mark all of their dues and the names without marks none.

Σαµῶυς is an Egyptian name that means “may (the god) seize them” only attested in Greek papyri in the 3rd century BCE, providing further confirmation of the date.\textsuperscript{179} Αρ is the beginning of the patronym.

10 [ . . ]ρως Πα\{ sits partially across the break in the papyrus. There is no evidence for a check mark, which usually descend to the top of the next line. Many Egyptian names end ρως,\textsuperscript{180} and only one or two letters could be in the lacuna. Άρως and Ναρως are the most likely candidates.

11 Μίσις is another Egyptian name that means “fierce looking lion;”\textsuperscript{181} it occurs over 100 times in the papyrological record.\textsuperscript{182}

12 Αρυω is expected to be a patronym in the genitive, most likely the genitive Ἀρυότου for the relatively common Egyptian name Ἀρυότης.\textsuperscript{183}

13 Ορκελυ appears quite clearly on the papyrus next to a check mark, just as the others, and thus should be interpreted as a previously unattested name. The name may be related to other Egyptian names beginning Ὅρκ such as Ὅρκατής, Ὅρκατυτις, and Ὅρκουεις, but the epsilon and lambda are very clear, thus ruling out these three options.

14 Σαµῶυς μύκρος refers to a second Σαµῶους in this document who has the descriptor μύκρος: the ‘small,’ ‘short,’ or younger Σαµῶους. The two men may be related.

\textsuperscript{179} E. Luddeckens et al., \textit{Demotisches Namenbuch}, volume 1, 18 parts (Wiesbaden, Reichert, 1980-present), 1348-1349: 1358.

\textsuperscript{180} Twenty-two attested names end this way (plus some variants); likely candidates are: Άρως, Ναρως, Περως, Πρως, Σρως, Σαρως, Ταρως, Τερως, and Φερως.

\textsuperscript{181} Luddeckens, \textit{Demotisches Namenbuch}, 576-577.

\textsuperscript{182} As attested on papyri.info.

\textsuperscript{183} Attested over 600 times on papyri.info.
15 X Νεχθεύτις is an unattested nominative form, probably a variant of the Egyptian name Νεχθεύς, attested once (1 CE). This is the first name that appears with the x-mark next to it, perhaps, as mentioned above, because the people in these entries have only paid half (or some other amount) of their dues. There is a small gap (0.9 cm) before the papyrus breaks; if figures were present, they were lined up in a column after a blank space.

Φαβήτος is a genitive form for the patronym, and Φαβῆς is the most probable nominative form, a variant form of Φᾶβις attested from the first century CE.

16 Ἀχµόσις is an Egyptian name variant of Ἀµῶς attested only once in the third century BCE. The uncertainty in the central portion make Ἀχµόσις or an unattested name possible.

ἈἈ ἈἈµῶ µῶ µῶ µῶτος τος τος τος is the patronym, the genitive form of Ἀµῶς, a relatively common Egyptian name that is well-attested in the third century BCE. A blank space of 1.2 cm follows this name.

**Comments on Misc. 6**

Misc. 6 is conclusively a list for tax payments in arrears, as identified from the elements common to such lists: 1) the current year, 2) the person involved with the collection, 3) a verb of collection, in this case λογεύω, with the possibility of it being ἐπιλογεύω in reference to the levying of taxes in arrears, 4) the item on which the tax is levied sometimes after ἀπὸ τιµῆς, 5) the specification of an earlier date in which the payments were due written in the genitive case and 6) the location. Specifically, the evidence of 1, 3 and 5 is enough to identify payments in

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184 *P.Oxy.* 4 739.5.
185 *P.Bour.* 42.311, 337.
186 O.*Strasb.* 1 329.v1.
187 *P.Sarap.* 76.13.
188 There are 8 third century BCE examples: *P.L.Bat.* 20 63, col. 2.29; *PSI* 6 626, col. 1.7; *P.Lille* 1 58, II.3, 18, III.11; *PSI* 5 508.16; *P.CairoZen.* 2 59172. 10, 23, 31; *P.Tebt.* 3 1080.6; *P.Petr.* 3 68 (a).2; *P.Lille* 1 5.103; 59.110.
arrears, which strongly, but not to conclusively indicate tax payments, while the verb λογεύω and
the phrase ἀπὸ τιμῆς are often present in tax collection contexts.\textsuperscript{189} The multiple columns
apparent on this papyrus, with the first one unlikely to be directly related to the second column
since a new heading was created, indicates that this is some sort of official register, probably a
tax or village register, or, less likely, a large business account drawn up by the tax collector.
There is little evidence for what kind of tax payment this document refers to, since all the
amounts are lost, but the οἱ after τιμῆς could be οἶνου, wine.

This document is notable for its early, although inconclusive, evidence (third century
BCE) of the existence of the village Τοχνοῦβις. The names of the taxed individuals, which are
entirely Egyptian, including the tax collector Horos Achomneuios, are congruent with that of a
small rural village in Upper Egypt such as Τοχνοῦβις. Furthermore, if this document does refer
to the known Τοχνοῦβις, then the provenance of this document is probably Hermopolites, which
is not the expected provenance for a Hibeh papyrus, as the tentative identification as RW Inv.
14A would make it. This is another line of evidence that this piece may belong to the PT
Inventory.

8. The Preliminary Catalogue for the Classics Department Papyrus Collection

As indicated at the beginning of this paper, none of the papyri in the Classics Department
Papyrus Collection, with the exception of \emph{P.Hib.} 2.184 = RW Inv. 135C, have heretofore been
published or described, and there has previously been no systematic attempt to catalogue the
contents of the inventory designations. Therefore, a preliminary catalogue of papyri has been
developed and is appended to this paper. This catalogue has been submitted to the library with
the intention that a physical paper copy and a modifiable digital copy be made available to
researchers.

\textsuperscript{189} \emph{P.Hels.} 1 26.
The fields in the catalogue are: inventory number, box number, storage method, material, language, date, document type, number of fragments, dimensions, and notes (table 1 provides three sample entries). These fields were chosen based on the type of information that is useful to papyrologists and commonly included in other databases, such as the Advanced Papyrological Information System (APIS), and papyri.info, the database that integrates information from APIS, the Duke Databank of Documentary Papyri (DDbDP), Heidelberger Gesamtverzeichnis der griechischen Papyrusurkunden Ägyptens (HGV) and Bibliographie Papyrologique (BP). There are more informational fields in APIS than papyri.info; APIS’s fields are: holding institution or library, catalogue and/or publication number(s), material, conservation status, dimensions, number of fragments, source, provenance, language and script, date(s), document type, author, people and places mentioned, transcription, translation, and secondary literature about the object. Certain fields are not relevant for this catalogue, such as holding institution, which is the University of Toronto, Thomas Fisher Rare Book Library for each entry. Including fields for full transcriptions and translations is also beyond the scope of this project. There are also, as a result of the paucity of transcription, very few pieces that have any information for author, and people and places mentioned, which makes these fields unnecessary at this time. In the very few cases where this information is known, the notes include it or direct the reader to a published or unpublished transcription. Much more research will be needed to describe every piece to the level of detail expected for APIS, and should this project be embarked upon, it may be worthwhile to select a subset of the larger pieces that contain one or more decipherable lines of at least several words.

The terminology and methodology for each field also bears explanation to facilitate searches and inform future decisions about the information contained in them. The first field is

the inventory number, which refers to the old Classics Department inventory system. These numbers are exactly the same as the inventory designations written on the storage boxes and folders or frames. The OUG Inv. designations that are stored in folders are called “Gazette Folder” followed by a number and sometimes a letter. The OUG Inv. designations stored in frames are called “OUG Inv” followed by a number. Uncatalogued OUG material is currently called “OUG Unc,” but these designations are likely to change in the future. Each PT Inv. is referred to as “PT Inv” followed by the abbreviation for the language (“Gr,” “Ar” or “Ct”), a number and sometimes a letter. The only irregularities among the PT Inv. are several uncertainties noted by a question mark, such as “PT Inv Gr 7C?” and “PT Inv Gr 22(32?),” or are miscellaneous material that has been identified as PT material. The miscellaneous PT designations are currently only: “Unmarked 4 = PT Inv Ar 48 (49?)” and “Unmarked 3 = PT Inv Ct 50.” Each RW Inv. is referred to by “RW Inv” followed by a number and sometimes a letter. The irregularities in this sequence include: two RW Inv. 11 designations that are distinguished by label colour (“RW Inv 11 (black label)” and “RW Inv 11 (red label)” ) and three miscellaneous items assigned to this collection (“Miscellaneous 6 = RW Inv 14A?,” “Unmarked 2 (RW Inv 136?)” and “Unmarked 17 = RW Inv ?”). The entries are organized in order according to collection and inventory number. After the inventory number is the field for the box number, simply called “Box,” which provides the box number from seven through 64 in which the frames and folders may be found. The inventory numbers are not organized sequentially into boxes, so sequential inventory designations may be in vastly different boxes, such as PT Inv. Gr. 4, which is in box 58, and PT inv. Gr. 5, which is in box 7.

The field “Storage Method” refers to the type of material that is currently housing each papyrus. Broadly, the categories are folders and frames, with the specific material listed after
this entry. For frames, the two types are glass and PMMA (Plexiglas), which are listed in the catalogue as follows: “Frame; PMMA (Plexiglas)” and “Frame; Glass.” The folders either contain acid free paper sub-folders or Oxford University Gazette newsprint, and these are identified as follows: “Folder; Acid-free paper” and “Folder; Original Oxford Gazette newsprint.” The next field is “Material,” in which the substrate for writing is indicated: either “Papyrus” or, in two entries, “Parchment.” Language is listed next, which can be “Greek,” “Demotic,” “Coptic,” “Arabic,” “Ethiopic,” or “no writing”, with uncertainty indicated by a question mark.

The dates in the “Date” field are often imprecise estimates from palaeography. Palaeographical estimates are frequently given by century, such as “3rd century BCE,” or in broader date ranges, such as “300-700 CE.” In order to make palaeographical estimates, the handwriting was compared with forms given in palaeographical handbooks191 and the examples published online in PapPal.192 In several cases precise dating has been possible, such as for Misc. 6 (RW Inv. 14A?), which has been dated to “July/August 245 [or 244] BCE.” Several discrete dates are also possible for a legible date formulae, such as for PT Inv. Gr. 12, which clearly displays the words ἔτους γ τύβι κς that can refer to “March 244, 219, 202, or 178 BCE,” as written in the catalogue. Uncertainty is indicated with a question mark. Future work is very likely to produce more precise or different dates for many pieces, which ideally will be updated in the catalogue as the information becomes available.

The field “Document Type” indicates the type(s) of content written on the pieces. The broad categories are: account, contract, dating formula, decree, letter, list, literary, receipt and


register. More categories may be developed in the future. Each of these categories may be further described such as “draft of a letter,” “list of names,” or “money account.” The number of fragments is listed next; fragments are pieces with at least several visible letters and are usually larger than 2 x 2 centimeters. Listed alongside the fragment number is the number of small scraps, which are usually smaller than 3 x 3 cm and have little or no writing. The dimensions are listed in the “Dimension” field according to fragment number. The dimensions of scraps are not listed.

The “Notes” section lists any other information that is currently known about each piece of papyrus. The general format is: to first identify if the piece comes from cartonnage; describe the colour and conservation status of the fragment(s); describe the hand(s); list some of the content; and list the margin status and number of lines for each fragment, front and back. This information is aimed to help a researcher quickly identify which pieces are of most interest to them, such as, for example, only contracts that consist of at least 7 preserved lines or receipts that mention grain. Indeed, certain folders can quickly be identified as containing only small scraps that will not be able to be transcribed or fragments without any apparent writing on them.

9. Conclusions

The main goals of this research project were to increase the accessibility of the Classics Department Papyrus Collection for scholarship and to assist in its conservation. The preliminary catalogue is the starting point for researchers to identify documents of interest, after which the images may be requested and used to prepare transcriptions and translations. The NIR and VIS images are intended to be maintained by the Fisher Library in TIF format and distributed at the discretion of the library. These two aspects of the project significantly decrease the need for physical examination of the papyri, which is a great benefit for their preservation. It will still be
necessary for researchers to access the papyri on occasion, such as when finalizing a description or transcription, but the papyri will no longer need to be moved around and handled on a daily basis. For this reason, future preservation in glass may only be necessary for large fragments that require support to prevent breakage. If papyri are not preserved in glass, the ability to image them at various wavelengths remains open. Furthermore, one negative aspect of papyrus storage in glass is that a harmful microclimate that encourage salt efflorescence and/or mold growth may develop between the glass plates. All of the Victoria University papyri showed evidence of salt efflorescence when examined in 2002.\(^{193}\) There is also evidence that salt efflorescence has occurred on several Classics Department papyri,\(^{194}\) as well as physical damage to glass frames,\(^{195}\) which issues to be addressed in future conservation projects.

There are also multiple areas of further research in the organization of the Classics Department Papyrus Collection. First, numerous small and large fragments that are currently listed as miscellaneous, unmarked or unidentified may be tentatively assigned to their appropriate collections through the identification of relationships between fragments of known inventory numbers and the miscellaneous ones. Additionally, fragments of the same document held in different inventory designations may be identified and brought back together. This occurs commonly since the papyrus cartonnage was regularly cut up when it was shipped from Egypt. Conversely, unrelated fragments in the same folders may be separated into different folders while still maintaining a designation system that identifies the fragments as coming from the same cartonnage source. Separating unrelated papyri from the same folder will have the added benefit of contributing to their preservation by preventing the pieces from overlapping and

\(^{194}\) RW Inv. 30 has a ‘halo’ around the papyrus, which is usually the result of salt efflorescence; RW Inv. 11 (red label), for example, is very securely stuck to the glass, a sign of moisture or other issues.
\(^{195}\) Such as RW Inv. 57, RW Inv. 78 and RW Inv. 135C.
possibly becoming entangled. Finally, box 12 still requires organization and conservational attention. Its fragments are still housed in the original Oxford University Gazette newsprint, which, although it is essentially acid free and has maintained the papyri in stable condition for many decades, may be changed simply to standardize the storage of the fragments. Its main issue, however, is that numerous unrelated fragments are currently stored in each folder and they would benefit from being moved to separate folders that would be easier to handle. Should this project be undertaken, the preservation of the Oxford University Gazettes and the creation of a system that identifies which pieces were stored in which folders is important for researchers to be able to access the original notes made by the first papyrologists who worked on the collection.

The digital NIR photography on this collection is particularly useful to researchers in facilitating the decipherment of the numerous damaged fragments that make up a large proportion of the papyri. This research conclusively shows that NIR photography is of particular use for collections of cartonnage because ink and ink traces are much more visible in NIR through traces of gesso, stains, and on darkened papyrus substrate, which are common issues for cartonnage pieces. Even, however, for ostensibly legible papyri, NIR photographs can provide clarity for the few words that are difficult, and it makes any reading easier. NIR images of papyri housed in glass and PMMA are also valuable because the papyrus substrate still appears pale and ink is visible through some obstacles, such as gesso. Indeed, NIR images are extremely useful for papyri housed in PMMA since the plates cannot be opened, which means that the cleaning away of gesso or other obstructions that remain on some of the pieces cannot be performed.

The preliminary catalogue appended to this paper is the main product of this project, and is intended to be made accessible in print and a modifiable digital version either at the library or
online such that new information and corrections may be added to it. The preliminary catalogue has also been set up as a starting point for developing and organizing the necessary information for the inclusion of descriptions of the Classics Department papyri in online databases, such as the Advanced Papyrological Information System (APIS). The University of Toronto already participates in APIS: all of the Victoria University papyri have already been submitted. A promising future project is to make a subset of the Classics Department papyri available online through APIS.

Overall, the Classics Department Papyrus Collection consists of numerous documents similar to the three transcribed and translated in section seven of this paper, as well as many letter fragments, some contracts and a few very small potential literary fragments. Internal evidence from these documents as they are transcribed and translated provides the much-needed clues to the provenance of the purchased papyri, such as the slight possibility of some of them arriving from the Hermopolites, as indicated by Misc. 6. Additionally, the investigation and publication of the contents of these papyri will surely provide much new information about the Greek and Roman administration of and daily life in Egypt. Their exact impacts will not be known until the work is carried out.
10. Bibliography

The abbreviations of papyri and ostraca used are those listed in:


Secondary Sources:


Bilabel, Friedrich. “Der Griechische Name der Stadt El-Hibe.” *Philologus* 77 (1921): 422-5


Transmissivity and Absorptivity versus Wavelength for Single Pane Window Glass

Figure 1. Transmission and Absorption of Ultraviolet, Visible Light and Infrared by Glass. Transmissivity is a measure of the ability of a substance to transmit electromagnetic radiation such as light. The thickness and type of glass (such as glazed or coloured) impacts the transmission and absorption of electromagnetic radiation. The exact properties of the glass on the Thomas Fisher Rare Book Library papyri is not identical to that used in the experiment by Mitalas and Stephenson, from which this graph is adapted.
Mitalas and Stephenson report that their glass is glazed, unlike the glass typically used to house papyri, but the data still indicates that transmission of near infrared (700-1400 nm) is significant. According to the data from this experiment, the transmission for the range of interest for photography on papyri (900-1000 nm) is approximately 15 percent less than visible light. Since the photography of papyri uses reflected near infrared, the radiation must pass through the glass pane twice, causing a decrease of approximately 15 percent in the amount transmitted each time compared to visible light. Certain types of glass used specifically for spectrometry show very little decrease in transmission in the infrared range, such as thin glass and PMMA (Plexiglas) cells for performing spectrometry on liquids available from Shimadzu Corporation, “Cell Types and Their Selection.” $\theta$ is the angle of incidence, which also impacts the transmission and absorption of radiation because the radiation must take a longer path through the glass as the angle of incidence increases towards 90 degrees. The papyri were photographed with approximate angles of incidence of 45 degrees, with some ambient light also present. This graph is adapted from Mitalas and Stephenson, *Absorption and Transmission*, 31.
According to the makers of Plexiglas brand Poly(methyl methacrylate) (PMMA), transmission (or transmittance, the ratio of the amount of energy transmitted to the incident amount) occurs through the near infrared range, but decreases at certain bands such as at approximately 900 nm (which is the first noticeable decrease in transmission). Additionally, as thickness of the Plexiglas sheet increases, transmission of the radiation decreases logarithmically. The transmission remains steadily high through the visible light range, as shown at 700 nm on this graph, making the difference between visible light and near infrared photographs noticeable. The thickness of the poly(methyl methacrylate) on the papyri is approximately 1 cm, which is between the two thicknesses reported in this graph, but the near infrared must pass through the PMMA twice to be reflected back to the camera sensor causing a loss each time. This graph is adapted from “Plexiglas® Acrylic Sheet: General Information and Physical Properties,” Altuglas International, Arkema Group.
Figure 3. The Camera Set-Up for Photography. (A) The Nikon D200 Camera modified for near infrared (NIR) photography is mounted on a copy stand above (B) the photography stage, which was covered with a white background sheet during photography. (C) The flip-down filter mounting device holds the PECA 912 filter that blocks out all light except NIR. (D) The incandescent lamps used for additional lighting during visible light photography; the Vivitar 285-HV Flashes were mounted approximately where the lights are for NIR photography. (E) The computer in the background is used to control the camera using Nikon Camera Control Pro 2.
The PECA 912 filter was placed over the camera lens during near infrared (NIR) photography to block out visible light. Reflected NIR radiation between 700 and 1200 nm passed through the filter. The camera’s silicon sensor records radiation wavelengths up to a maximum of 1100 nm, although sensitivity drops at 1000 nm. The NIR image, therefore, is predominantly a representation of reflected NIR radiation between 750 and 1000 nm.
Figure 5. SW-5IR Clone Flash Adapter Transmission Spectrum. The SW-5IR Clone Flash Adapter filter blocks out radiation below approximately 750 nm. As a result, during NIR photography almost exclusively infrared radiation reaches the papyri to be reflected back to the sensor in the digital camera. Only a small amount of visible light leaked into the photography room. Modified from Shane Elen, “Beyond Visible,” http://www.beyondvisible.com/BV4a-SW5UVSW5IRadapters.html
Figure 6. Visible Light and Near Infrared Photographs of PT Inv. Gr. 3, a Highly Damaged Papyrus. PT Inv. Gr. 3 is a highly damaged papyrus suffering from holes, stains, effaced ink and areas of darkened papyrus. (A) Fragment 1 line 11, the visible light image reads as }, οσκ/ιβωπεγ, while the near infrared (NIR) image clearly shows an alpha that was previously invisible, reading }, α καρτικ. (B) A red stain appears pale grey in NIR, which is less distracting. (C) The darkened area of the papyrus is more legible in the NIR photograph. Lines 7-9 show little improvement because almost all of the ink is completely lost.
Figure 7. Visible Light and Near Infrared Photographs of OUG Inv. 18 Fragment 1, a Stained Papyrus. The back of OUG Inv. 18 fragment 1 is mostly obscured by a large stain. The stain partially transmits near infrared, making five lines visible. (A) Line four reads ἐπὶ χόρτον. No letters from this line can be seen in visible light.
Figure 8. Visible Light and Near Infrared Photographs of OUG 101 Fragment 3, a Stained Papyrus. OUG 101 fragment 3 only displays five letters in visible light, but the near infrared photograph reveals ἄρ(τάβας) ριε [ for the first line and ἄρ(τάβας) χπζ [ for the second line. The old cataloguing marks on the top right corner that appear orange in the visible light image transmit near infrared completely, and disappear in the near infrared image.
Figure 9. Visible Light and Near Infrared Photographs of OUG Inv. 91 Fragment 1, a Poorly Legible and Stained Papyrus. OUG Inv. 91 fragment 1 is a very poorly legible fragment that suffers from stains, darkened papyrus, gesso traces, holes and effaced ink. (A) Line five appears as perhaps ἁρμον ὁυτο ἀνάφολα. (B) Line seven appears as ] (illegible)υς δου [.
Figure 10a: Overview

Visible light

(A)

(B)

Near infrared

(A)

(B)
Figure 10a: An overview of OUG Inv. 9 fragment 1, which is covered with a thick coat of gesso.

9b: Magnification of the areas of increased legibility for OUG Inv. 9 fragment 1. (A) Line six appears through gesso in the NIR image, the end of which clearly reads βολαι. (B) A spot of gesso in line ten is too thick to transmit NIR.

Figure 10. Visible Light and Near Infrared Photographs of OUG Inv. 9 Fragment 1, a Papyrus Covered with Thick Gesso.

(A) Line six appears through gesso in the NIR image, the end of which clearly reads βολαι. (B) A spot of gesso in line ten is too thick to transmit NIR.
Figure 11. Visible Light and Near Infrared Photographs of OUG Inv. 121 Fragment 1, a Papyrus with Thick Gesso and Gesso Residue. 10a: An overview of OUG Inv. 121 fragment 1 in visible light and near infrared (NIR), which is covered with gesso and gesso residue. 10b: Magnification of the areas of improved legibility. (A) In NIR, ϊε Φαµενὼθ becomes clear at the end of line one, while in VIS, only the (ἔτους) ι is clear. (B) The date in line four shows up through a relatively thick gesso layer in NIR. (C) In NIR, γεωµετρικὸν in line 12—and the entire bottom portion—is much more visible through thin gesso remnants.
Figure 12. Visible Light and Near Infrared Photographs of OUG Inv. 94 Fragment 6, a Dark Papyrus. OUG Inv. 94 fragment 6 has traces of ink at the top (line one) and three more damaged and incomplete lines (lines two to four). The presence of these lines is clear even in visible light, but the dark papyrus causes significant difficulty in distinguishing the letters, which is also exacerbated by traces of gesso at the top left. The near infrared allows most of the lines to be read, for example line two: ] τα τουτοις . . . (traces)[. 
Figure 13. Visible Light and Near Infrared Photographs of OUG Inv. 121 Fragment 2, a Dark Papyrus. OUG Inv. 121 fragment 2 is a dark papyrus also partially covered with thin and thick layers of gesso. In visible light, the first two lines are apparent, but difficult to distinguish from the background. The ink becomes very clear in near infrared (NIR). (A) The reading Ἀδελφῶν through relatively thick gesso and on the dark papyrus is facilitated by NIR.
Figure 14a: Overview
Figure 14. Visible Light and Near Infrared Photographs of OUG Inv. 59 Fragment 1, a Papyrus with Effaced Ink. OUG Inv. 59 fragment 1 is a large but highly damaged letter. The papyrus surface is abraded and most of the ink is effaced. The ink remnants are much more visible in the near infrared photograph, particularly (A) ἔρρωσε.
Miscellaneous 6, tentatively identified as RW Inv. 14A, is a document listing people who owe taxes for year 29 of Ptolemy II Philadelphus in the year 3 Ptolemy III Euergetes. The ink on the bottom right is almost completely washed away. The remaining traces are slightly more visible in near infrared. Lines 11 to 13 read as: / Σαμίος Μήκος Σαμίων[τος] / ΧΝεχθεύτς Φαβήτος / Χ Άχμασς Άμωτος /
Figure 16. Visible Light and Near Infrared Photographs of RW Inv. 129, a Papyrus in Glass. RW Inv. 129 is a Ptolemaic money account that has blurred ink and a dark papyrus background. Near infrared photography was performed through its glass casing with moderately successful results. The first four lines and the last two lines (10 and 11) show significant improvement from NIR.
Figure 17. Visible Light and Near Infrared Photographs of PT Inv. Gr. 3 Fragment 1, a Papyrus in Poly(methyl Methacrylate) (Plexiglas). PT Inv. Gr. 3 fragment 1 is an example of near infrared photography through poly(methyl Methacrylate) (Plexiglas). (A) In near infrared, the ink under a small smear of gesso is visible: πρὸς τα[ .
<table>
<thead>
<tr>
<th>Inventory number</th>
<th>Box</th>
<th>Storage method</th>
<th>Material</th>
<th>Language</th>
<th>Date</th>
<th>Document type</th>
<th>Number of fragments</th>
<th>Dimensions (cm, height by width)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT Inv Gr 7C?</td>
<td>7</td>
<td>Folder; Acid-free paper</td>
<td>Papyrus</td>
<td>Greek</td>
<td>200 BCE-200 CE</td>
<td>Tax/business account/list</td>
<td>4 + 4 scraps</td>
<td>fr. 1: 10.6 x 10.0; fr. 2: 11.8 x 8.8; fr. 3: 11.8 x 8.6; fr. 4: 9.9 x 3.1</td>
<td>Cartonnage, thick paint of various colours covers the backs of fr. 1 and 3. The hand is a fine cursive, consistent with the first century BCE, but similar forms also appear earlier and later. The fragments show numerous holes and effaced ink at places. Large X marks on fragments 1, 2 and 3 next to entries indicate a list, with some names apparent—possibly a taxation list or business account. Fr. 1: only the left margin is present but highly damaged, 7 lines along the fibres; fr. 2: no margins, ?? very damaged lines along the fibres; fr. 3: possible left margin, 7 lines along the fibres; fr. 4: no margins, front, very damaged, traces of ink; back, 4 lines against the fibres.</td>
</tr>
<tr>
<td>PT Inv Gr 16B</td>
<td>8</td>
<td>Folder; Acid-free paper</td>
<td>Papyrus</td>
<td>Greek</td>
<td>Most likely 225 (or 263, or 183) BCE</td>
<td>Draft? of a letter</td>
<td>1</td>
<td>12.4 x 8.6</td>
<td>Cartonnage. Much of the letter is lost, but the date (ἐτός) κβ φομοοϋθι κγ can be read. Left margin intact, possible right margin, front, 6 lines with traces of 3 more, written along the fibres, many erasures, deletions and insertions.</td>
</tr>
<tr>
<td>PT Inv Gr 20A</td>
<td>8</td>
<td>Folder; Acid-free paper</td>
<td>Papyrus</td>
<td>No writing</td>
<td></td>
<td></td>
<td>3 scraps</td>
<td></td>
<td>Cartonnage. Very small fragments. No writing.</td>
</tr>
</tbody>
</table>

Table 1. Three Sample Entries in the Preliminary Catalogue of the Classics Department Papyrus Collection.