THE LIBRARY ACQUIRES MORE PHOTOGRAPHS BY LEWIS CARROLL

A collection of photographs taken by Charles L. Dodgson (Lewis Carroll) has recently been acquired by Christ Church Library, with help from an alumnus. There are eight Dodgson photographs in this collection and this considerably increases the status of Dodgson photographs held by the Library. Dodgson was renowned for his photographs of children during the Victorian age. He invited the family of his colleagues to visit his studio so that the children could be photographed. Of his opus of photographs amounting to about 3000 images, about half of them are children, either separately or in small groups. Many photographers of his era found portraits of children difficult because keeping still did not come naturally to them. Dodgson knew that making them comfortable and telling them a story helped enormously.

continued on page 34

Hebrew Incunabula at Christ Church

Among many other exciting projects that relate to early printed books, Christ Church takes pride in research activities that promote its collection of Hebrew incunabula and their digitisation.

Between 2017 and 2018, cataloguing and study of the majority of Hebrew incunabula copies in various libraries in Oxford, Cambridge and Manchester took place, as part of the 15cBOOKTRADE project (http://15cbooktrade.ox.ac.uk), of which the Hebrew books side was generously funded by the Rothschild Foundation Hanadiv Europe. Entries of all examined copies have been added to the Material Evidence in Incunabula database that can be accessed online for free (https://data.cerl.org/mei/_search).

continued on page 2

THIS ISSUE

More Photographs by Lewis Carroll
Hebrew Incunabula at Christ Church
William Blake’s Rolling Press at Christ Church
Christ Church’s 18th Century Renaissance
Lord Portal Hawking Diaries
“The Flower of Spain” in the Portal Archive
Exhibitions in the Upper Library
Damage in Kepler’s Astronomiae Pars Optica

The Making of a Renaissance Bestseller: Albrecht Dürer’s Treatise of Geometry

Detail from a Genji-e by the Japanese artist Toyokuni II (Utagawa Kunisada, 1786–1864). Woodblock print (Brady 2.11.19.10). Part of a large collection of theatrical ephemera. Extensive research and cataloguing work of an extensive section of this collection has started in October 2019 thanks to a generous grant from the Leverhulme Foundation.
Furthermore, all copies of Hebrew incunabula found at Christ Church have now also been made digitally available via the Christ Church Library website where scholars and bibliophiles are welcome to examine them also through this medium.¹

When Johannes Gutenberg printed his first Bible with movable type in Mainz, Germany, around 1455, the age of printing started in the West. The first products of the printing press, cradle books or incunabula,—that is all books that were printed between 1450 and 1500—have been carefully studied and valued as precious objects ever since. These first books that were printed in Europe with movable type are important historical evidence of texts that circulated before and during the 15th century; they also shed light on literacy and reading practices of their owners, printers and other users. While studying incunabula, it is important to observe the transmission of texts from manuscript to printed format, considering layout that may or may not include commentaries and other annotations or illuminations. As is the case with manuscripts, also with first printed books, their original owners often play an active part in determining the final result, that is to say whether they wish their copies to come with lavish decorations and initials and be printed on vellum or paper.²

Such details, along with the size of print run of specific editions, often determine the market value of books. Every surviving copy of an incunabulum tells its own unique story of its movement and use, much of which can be traced and followed, by taking notice of every detail that it contains or those which could be linked to it: handwritten notes by owners, booksellers and collectors, censors’ signatures and dates, stamps, bindings, bookplates, auction catalogues etc. Reconstructing the movement of books and changes of hands, trying to understand why and how it has happened, can offer a broader picture of both Renaissance book collectors or dealers, and centres of book trade.³

Research on Hebrew incunabula in major collections

In the course of my research on owners, censors and book dealers of Hebrew incunabula, I have observed some interesting phenomena and have been able to identify a few historical persons who were involved in this business from early on. First, it is interesting to compare the social strata of Jews and Christians who left their annotations in these books or who can be identified by other layers of material evidence (e.g. bookplates or bindings).

While the majority of Jewish owners of incunabula include rabbis, physicians and many anonymous owners, most Christian collectors comprise scholars, librarians and aristocrats. An interesting example is an Italian rabbi Isaac Pragi (Faraggi) who was active ca. 1643 and apparently had a huge library for those days. For some reason, it appears that his library was sold in late 1640s as implied by extant copies that are today both at the Cambridge University and Bodleian Libraries.⁴

Such details, along with the size of print run of specific editions, often determine the market value of books. Every surviving copy of an incunabulum tells its own unique story of its movement and use, much of which can be traced and followed, by taking notice of every detail that it contains or those which could be linked to it: handwritten notes by owners, booksellers and collectors, censors’ signatures and dates, stamps, bindings, bookplates, auction catalogues etc. Reconstructing the movement of books and changes of hands, trying to understand why and how it has happened, can offer a broader picture of both Renaissance book collectors or dealers, and centres of book trade.³

¹ Christ Church Library web pages are regularly updated; see https://www.chch.ox.ac.uk/library-and-archives/early-printed-books
² As far as first Hebrew books are concerned, de luxe copies printed on parchment are known for a quarter of Hebrew incunabulum editions. See Aron Freimann,’Die hebräischen Pergamentdrucke’, in Zeitschrift für Hebräische Bibliographie 15 (1901), 46-57; Brad Sabin Hill,’Hebrew Printing on Vellum’, in Robin Alston, ed., Books Printed on Vellum in the Collections of the British Library (London: The British Library, 1996), 180. See also Adi Offenberg, Hebrew Incunabula in Public Collections: A First International Census (Leiden: Brill, 1990) where he lists copies of 34 editions that were printed on parchment.
³ In the case of expelled Jewish communities, it is possible to identify the ways in which the books followed their scholarly owners, sometimes changing continents and cultures. These journeys can be followed on the Material Evidence in Incunabula database. The innovative technique of visualisation enables the display of the trade routes of any 15th-century books and the formation or dispersal of collections. See http://15cbooktrade.ox.ac.uk/visualization/
⁴ These copies were bought from the London bookseller George Thomason between 1647 and 1648.
Such provenance research sometimes yields references also to Renaissance female patrons. For instance, as inferred from an early 16th century Hebrew provenance note that deals with Judah’s purchase of the book for 40 ducats, a de luxe copy of the Hebrew Bible was indeed once owned by a Jewish woman. Moreover, this Judah, son of Moses and his family may perhaps be associated with the currently unidentified coat of arms that includes a lion with an astrolabe.

In a Cambridge University Library copy of Yosippon we find a 1575 inscription that reads: ‘I am Lipman, son of Aaron ha-Cohen. I have sold this book to Rabbi Samuel Gabriel of Carpi, with the approval of my sister-in-law, Rica for 4 florins’. The inclusion of women is not surprising if we consider their important role in printing these early books. To be sure indeed, Abraham Conat, a Jewish physician and scholar co-managed his printing business with his wife Estellina.

The seventeenth century was the golden age of Oriental studies in Oxford. Contemporary reputable Christian Hebraist scholars whose private collections included Hebrew incunabula were John Selden (1584-1654), Thomas Marshall (1621-1685), Edward Pococke (1604-1691) and Robert Huntington (1637-1701). Biblical scholar Benjamin Kennicott (1718-1783) acquired some of his Hebrew incunabula from the sale of the Bolongaro Crevenna library at the end of the 18th century. Shortly after, in 1817 Matteo Luigi Canonici’s (1727-1805) library arrived at Oxford, including a fragment of a Hebrew incunabulum. Apart from Christian scholars who collected Hebraica, Bodleian’s Hebrew incunabula equally come from Jewish private libraries. The most important among these is that of David Oppenheim (1664-1736), once a chief rabbi in Prague. His library was bought by the Bodleian in 1829, containing 39 Hebrew incunabula, some on parchment and most with a wealth of Hebrew marginalia, as well as censors’ signatures in Latin.

As far as the provenance is concerned, in Cambridge the story is similar. The famous Bible scholar Christian David Ginsburg (1831-1914) left his books for the Cambridge University Library and the books of the former librarian William Aldis Wright (1831-1914) can be found at Trinity college in Cambridge. These details that concern provenance have either been enclosed in owners’ notes, bookplates, bindings, handlists, auction catalogues, or secondary literature.

Curiously enough, some Hebrew incunabula in Cambridge and Manchester come from 19th century English gentlemen’s libraries. Alexander Lindsay, 25th Earl of Crawford (1812-1880) and George John, 2nd Earl Spencer (1758-1834) sold their libraries and their copies were acquired by Cambridge University Library and John Rylands library respectively. Spencer seems to have bought his Hebrew incunabula from the sale of the Canonici collection but he also acquired Giovanni Bernardo de Rossi’s (1742-1831) duplicates, via the booksellers Mr Ogle of Paternoster-Row and Mr J. Payne. On the other hand, when Spencer’s library was auctioned, the books reached Manchester in 1892 by the bequest of Mrs Enriqueta Rylands (1843-1908) who had built the library as a memorial to her deceased husband John.

Wider research on incunabula: (r)evolution?

Part of this research was conducted within the framework of the Material Evidence in Incunabula (MEI) database which is a useful and inspiring tool to discover and describes various hierarchies of provenance. This information helps us understand who used the books and how, when and where, so that each entry can be compared and if appropriate, linked to the data in other entries. Ideally, one can reconstruct digital collections of books, libraries, historical persons, geographical areas etc.

MEI is designed to communicate with other online tools and catalogues, such as Incunabula Short Title Catalogue (ISTC). This database, which comprises a major scholarly undertaking, includes information about all known editions of incunabula, giving details about their full titles, authors, printers, places and years of publication, as well as bibliographic references and recorded holding institutions. While the information on Hebrew incunabula still needs updating, some correcting, and also adding newly discovered editions, ISTC remains a crucial point of departure for all bibliographers and bibliophiles.

We cannot doubt the importance of the invention of printing in Western culture; both printed and, beforehand, handwritten books have immensely contributed to the spread of knowledge. However,

---

5 The book in question concerns the beautiful Holkham Bible that used to belong to Holkham Hall in Norfolk and was bought by the Bodleian in 1953. This copy was printed in Naples in 1492 by Joshua Solomon Soncino, on parchment and includes colour decorations, as well as gold leaf. For a full digital version, cf. https://digital.bodleian.ox.ac.uk/inquire/Discover/Search/#/?p=c+0.t+,rsrs+0,rsps+10,fa+,so+ox%3Asort%5Easc,scid+s+,pid+014a8e57-e084-46c2-96d2-877ff2c242fac,vi+b5f1b9bc-96f4-4096-bde9-ea24072effc0

6 In fact, the very first book printed at their press in Mantua in 1474 was printed by Estellina, according to the colophon in the Bechinat Olam.

7 Moreover, fragments of Hebrew incunabula have also been found among the cache of material from the Cairo Genizah, but also as end-papers or binding waste in Hebrew and non-Hebrew book bindings.

8 ISTC can be accessed for free via the following link: https://data.cerl.org/istc
there are scholars who argue that the invention of printing was perhaps, after all, not a revolution but only a natural development that grew out from the use and popularity of codices in the Middle Ages. Most likely, both sides are right: those, who propose printing as a revolutionary change of course in the history, and also the conservatives.\(^9\) The latter group would see printing mostly as a more efficient and faster way of copying, trading, and using texts but not as a movement that actually changed the reading practices or what was read.

### Some special features of Hebrew incunabula

Collaborative research projects that enable the comprehensive study of all aspects of early Western books, from texts to provenance, provide a suitable ground for revisiting the field of Hebrew incunabula. How do Hebrew incunabula compare to the first books in Roman, Greek and Cyrillic scripts that were all printed during the incunabular period? What is known about their texts, their production, and the number of their editions?

As Christian guilds in German lands did not permit Jews to enter the printing business, the first Hebrew books were published in Italy, Spain, Portugal and Constantinople. Naturally these books were influenced by local tastes, needs and skills. Some Jewish printers in Italy, notably the Soncinors comprised Jewish émigrés who had acquired this new trade in Germany.

The fonts in early Hebrew prints followed the established square and semi-cursive scripts in Sephardi and Ashkenazi Hebrew manuscripts. These were the sources that were used to produce new printed editions and their formats were the ones that their readers were familiar with. Due to the conservative nature of Hebrew texts and the rabbis’ attitude to the Jewish booklore, early Hebrew books imitate manuscripts, whether lacking or using the same navigation tools (title pages, subject headings, initial words) that original handwritten copies suggested. Bearing this in mind, it is hard to argue that printing revolutionised the already established format of the Hebrew book or corpus of Jewish literature. Of course, the printed word contributed towards the speedy dissemination of texts and thus advanced literacy further, also among women, adolescents and less advantaged parts of the society.

Still, there were also new developments introduced, as some printers, like Gershom Soncino operated both in Jewish and non-Jewish markets, printing texts in Hebrew, Latin, Greek and Italian which made his business open to various cultural preferences.\(^10\) It is known that he travelled frequently to acquire rare manuscripts and so he was the first printer of several important texts. Besides, he was also a pioneer in using woodcut illustrations in a Hebrew edition of Isaac ibn Sahula’s *Mashal ha-Kadmoni* that he printed in Italy, around 1497, as well as promoting the dissemination of secular works, such as Immanuel of Rome’s *Mahberot*, printed in Brescia in 1491. In addition to the towns of Soncino and Brescia, his books were also printed in Casalmaggiore, Barco, Fano, Pesaro, Ortona, Rimini, Ancona, Cesena, and later on in Constantinople and Salonika. That is to say that Gershom Soncino was an entrepreneur with a sensitivity to the needs of the market, which meant that he was able to accommodate the formats of the books he printed, from folio to pocket-books. By his collaboration with a team of scholars, typesetters and proofreaders, as well as in commissioning Francesco Grifo da Bologna to cut his letters, he made it clear that his standards were no less than those of Aldus Manutius.

New ideas and influences extended to many areas of book production. On the one hand, the woodcut frames and illuminations that appear in Hebrew books, suggest the local non-Jewish visual language. The choice of texts that were printed, on the other hand, reflects the interests and needs of the readers of these books. The first printed Hebrew books were probably produced in Rome in the 1460s. It is now thought that altogether, 6 different editions were printed by Obadiah, Manasseh and Benjamin of Rome, between 1469 and 1473. These books include David Kimhi’s Book of Roots, Levi ben Gershom’s Commentary on Daniel, Moses ben Nahman’s Commentary on the Torah, Nathan ben Jehiel’s lexicographical work *Arukh*, Solomon ben Abraham ibn Adret’s *Responsa* and Solomon ben Isaac’s Commentary on the Torah.\(^11\)

---


10 Gershom Soncino was active as a printer between 1489 and 1534; his Hebrew and non-Hebrew works amount to more than 100 volumes each, of which about 20 comprise Hebrew incunabula. Such a high professional productivity has made him one of the most successful printers of his time, while printing non-Hebrew books under the names of Hieronymus, Geronimo, or Girolamo.

11 For further details on ISTC, see:
1. David Kimhi’s *Sefer ha-Shorashim* [https://data.cerl.org/istc/id00102720](https://data.cerl.org/istc/id00102720)
2. Levi ben Gershom’s *Perush Daniel* [https://data.cerl.org/istc/il00189800](https://data.cerl.org/istc/il00189800)
3. Moses ben Nahman’s *Perush ha-Torah* [https://data.cerl.org/istc/im00866140](https://data.cerl.org/istc/im00866140)
4. Nathan ben Jehiel’s *Arukh* [https://data.cerl.org/istc/in00006500](https://data.cerl.org/istc/in00006500)
5. Solomon ben Abraham ibn Adret’s *Teshuvot She’elot* [https://data.cerl.org/istc/is00625100](https://data.cerl.org/istc/is00625100)
As over a third of all Hebrew incunabula are Bibles or biblical commentaries, it had been long believed that the very first Hebrew print was Nahmanides’ commentary on the Pentateuch. Current research, however, holds that actually the first product of the press in Rome was David Kimhi’s lexicographical work Sefer ha-Shorashim, likely printed in 1469.\(^{12}\) The fact that the Jews published a dictionary of the Bible before the Bible itself has implications on understanding the close relationship between the Hebrew language and textual culture in the Jewish tradition.

It is possible to assume that at the time of the adoption of printed books, durable parchment copies of Hebrew Bible codices were sufficiently available, while the skills for printing vocalised Hebrew texts had not yet fully developed. This reality too may explain the fact that biblical texts were only gradually introduced by the printers of incunabula, whose many first editions appeared without vowels. In the course of printing, the situation changed, and the Hebrew Bible became one of the most published Jewish books, meanwhile also serving the needs of a growing readership, increasingly comprising Christian-Hebraists.

The first dated Hebrew books come from Reggio di Calabria and Piove di Sacco, near Padua, and both editions were printed in 1475. These titles concern, first Rashi’s commentary on the Torah, printed by Abraham ben Garton in Reggio di Calabria on 17 February in 1475 and second, Jacob ben Asher’s Arba’ah Turim, printed in Piove di Sacco by Meshullam Cuzi on 3 July 1475.\(^{13}\) The beautiful, poetic colophon in the latter demonstrates the awareness of the revolutionary technique of printing: “I am the art that is the crown of all the arts. I myself am hidden, but in me all secrets are concealed. Without pens my script is clear to all; without scribes do I create books. In a moment I am dipped in ink. Without rulers, yet my script is evenly formed”\(^{14}\).

And yet, in terms of quality of work and artistic standards, printing accomplished so much more than merely beautiful script. Visual appeal of early Hebrew books was achieved by decorated woodcut frames or historiated initial word panels. In Italy, Jewish books reached the highest perfection in decoration and beauty. Joshua Solomon Soncino was the first Jewish printer to recycle in Hebrew books the borders that were used in Aesop’s Fables.

First, in Rashi’s Commentary on the Torah that he printed probably at Soncino in 1487\(^{15}\) and then a year later, in 1488 when he printed the editio princeps of the entire Hebrew Bible, with vowels and accents, also at Soncino.\(^{16}\)

The handsome woodcut border with lovely Italian putti was originally commissioned by the Neapolitan printer Francesco del Tuppo for his edition of Aesop’s Fables of 1485, and was later sold to Soncino who used it, as seen above, in several of his editions.

It is these beautifully decorated frames that made the Hebrew incunabula to be the most aesthetically pleasing Jewish books ever produced.

---

6. Solomon ben Isaac’s Perush ha-Torah
https://data.cerl.org/istc/is00625170

12 However, there is no colophon; for the discussion on how the scholars have come to this date, see Shimon Iakerson, Catalogue of Hebrew Incunabula from the Collection of the Library of the Jewish Theological Seminary of America (New York and Jerusalem: The Jewish Theological Seminary of America, 2004), x-xiii.

13 The first volume among the two, i.e. Rashi’s commentary is very rare as it is thought that only two copies of it survive to date, one at the Biblioteca Palatina in Parma and another at the Jewish Theological Seminary in New York, both incomplete. As far as the first edition of Arba’ah Turim is concerned, according to ISTC, there are currently 17 known holding institutions with that title.


---

http://www.internetculturale.it/jmms/iccuviewer/iccu.jsp?id=oaia3Awww.internetculturale.sbn.it%2FTeça%3A20%3A4NT000%3AparTeça078589_2

15 For an electronic copy, see the digitised version at the Biblioteca Palatina in Parma

http://www.internetculturale.it/jmms/iccuviewer/iccu.jsp?id=oaia3Awww.internetculturale.sbn.it%2FTeça%3A20%3A4NT000%3AparTeça078581&mode=all&teca=MagTeca++-ICCU&fulltext=1

16 For more details, see ISTC
https://data.cerl.org/istc/ib00525500
Among the many fine copies of decorated Hebrew incunabula in Oxford, a case in point is the beautiful Holkham Bible, that has already been mentioned above. Joshua Solomon Soncino recycles in this edition, printed in Naples in 1492 a woodcut border—another variation of many in use—which was probably first cut for a 1492 print of Aquila Volante, ascribed to Leonardus Aretinus and published by Ayolfus de Cantono in 1492 in Naples. This woodcut, that displays a hunting scene with putti, animals and birds, can be found at the beginning of the books of Genesis and Joshua.

Between the 1460s and 1500, from the first to the last Hebrew books of the incunabular period, Hebrew printing had established itself in major Jewish centres in Europe and Turkey and spread even further north- and eastwards. An estimated 2000-plus copies of around 140-150 editions of some 70 different texts of Hebrew books survive from the incunabulum period. My research on Hebrew incunabula continues as new discoveries are made of unknown editions, as well as the plethora of marginalia needing to be studied and published.

Hebrew incunabula at Christ Church

There is no doubt about the importance of the sizeable Hebrew collection at Christ Church, where collecting of Hebraica dates back to the days of the foundation of the college by Henry VIII in 1546. To date, the college hosts the Regius Professor of

---

17 For more details on ISTC, see https://data.cerl.org/istc(ib01231000
For a digitised copy at the Biblioteca Casanatense, Roma, go to
&search_terms=&show_metadata=true&adjacency=true&VIEWER_URL=/view/action/nmets.do?&DELIVERY_RULE_ID=7&divType=&usePid1=true&usePid2=true
19 Apart from several Italian towns, a few other cities where Hebrew printing prospered in early 16th centuries include Prague, Cracow, Lublin, Basel, Isny, Constantinople and Salonica.

---

20 There is data, although not comprehensive, about copies in public collections. As far as private collections are concerned, it is impossible to say how many copies of Hebrew incunabula are held in private hands. With regard to the number of editions, it is likely that unknown editions may still be identified. Further research in the field remains desideratum, as among current scholars there is not always consensus as far as understanding what Hebrew works were printed and where during the 15th century, or immediately thereafter. Given that Hebrew incunabula often do not include colophons and some printers continued to publish Hebrew books also in the 16th century, the blurred line between the 15th and 16th century Hebrew book is understandable.
Hebrew and its wide and varied collection of Jewish material is second in Oxford only to Bodley’s collection. Although there are other Oxford colleges with important Hebrew collections, such as Merton, Lincoln, Corpus Christi and Exeter—to name a few—copies of Hebrew incunabula in Oxford, outside the Bodleian Library are rare. Apart from Christ Church, also Merton, Queen’s and Exeter colleges all have copies of the very first Hebrew books. However, Christ Church’s four (different) editions of Hebrew incunabula in five volumes, amount to more than in any other college library in Oxford.

The Hebrew collection at Christ Church was acquired via the role of Regius Professor of Hebrew, on the basis of the teaching and research needs in Oxford. Subsequently, the college library is rich in material relating to the study of Hebrew language and the Hebrew Bible itself, also the five copies of incunabula reflect this interest. In the order of date when these books were printed, Christ Church’s collection includes:

1. The Former Prophets with a commentary by David Kimhi, printed by Joshua Solomon Soncino at Soncino in 1485. Joshua Solomon Soncino was the founder of the Soncino printing dynasty, which for three generations produced books that are remarkable for their number, contents, and typographical perfection. The family originated from Speyer on the Rhine, and settled in the first half of the fifteenth century at Soncino (a small town in Lombardy). Soncino’s commercial acumen is evident in his selection of the Former Prophets as one of his first printed editions. At the time when this volume appeared, there was yet no complete Hebrew Bible available in print. Aside from the Pentateuch (Bologna, 1482), only the Book of Psalms (Italy, 1477) and the Five Scrolls (Bologna, 1482) had been published. Soncino followed up the appearance of this work with an edition of Latter Prophets that appeared within a year.

Careful study of this copy at Christ Church has enabled me to discern a number of hands who have left their annotations (doodles, pen trials, chapter numbers etc.) in the margins. From these observations it is possible to infer that this book belonged to a number of Jewish owners (who remain anonymous) in the 15th, 16th and 17th centuries in Italy (this is evident from the Italian Hebrew script), while the known censors, who left their censorship deletions, as well as their names, are Dominico Irosonolomitano (1552-1621) and Alessandro Scipione (active ca. 1597), both active in and around Mantua. Perhaps it was somewhere there where one of the owners added to his slightly imperfect volume, some text in manuscript that he wrote by hand (in his neat and professional manner of writing) and also a most beautifully decorated initial word panel with zoomorphic figures, to the beginning of the book of Kings. The next two hierarchies of provenance that we can identify are modern: Copenhagen, 1786, Adler and Oxford, Christ Church, 19th century.

2. The Latter Prophets with the commentary by David Kimhi, printed by Joshua Solomon Soncino at Soncino in ca. 1485, bound in two volumes. It is interesting to note that this copy, in two volumes that contain the books of Isaiah, Jeremiah and Ezekiel, as well as Hosea, Joel and parts of Amos, was owned and annotated by an anonymous 16th century Italian Jew but also censored by an unidentified censor of Hebrew books in Italy, probably in the early 17th century. In the late 18th century it belonged to a certain Adler, as the ownership inscription “Adler 1796” (same as above) on the front flyleaf suggests. Provenance research has enabled me to ascertain that this specific owner was Jacob Georg Christian Adler (1756-1834), a notable 18th century German Orientalist and professor of Syriac language at the University of Copenhagen.


This Christ Church volume includes the books of Job, Canticles and Ecclesiastes; and once belonged to an Italian Jewish owner in the 16th century, as seen from owner’s marginal corrections. Furthermore, there were some occasional words in

23 Merton’s Hebrew incunabula have also been catalogued onto the MEI database. For full descriptions, see https://data.cerl.org/mei/_search?query=rahel%20fronda%20AND%20data.holdingInstitution.name.orig:%22Oxford,%20Merton%20College%22&fr
24 For ISTC record, see https://data.cerl.org/istc/ib00525760
25 See ISTC https://data.cerl.org/istc/ib00525970
26 For ISTC record, see https://data.cerl.org/istc/ib00525780
Hebrew added to the margins, in pencil during the 17th century. On the recto of the flyleaf, a later inscription reads ‘Donum Joannis Morris, S.T.D. hujuusae Aedis Canonici, & Ling. Heb. Prof. Reg.’. This note, however, probably does not mean that this very copy was once owned by John Morris (1594/5-1648), Regius Professor of Hebrew (1626-1648) but it is more likely that it was bought with the money that he left to the college for the purpose of its acquisition of Hebrew books.

4. The (complete) Hebrew Bible, printed by Gershom Soncino in Brescia in 1494.27

This is an incomplete copy of the Hebrew Bible (containing only the Prophets and Writings) that was printed in the small Italian town of Brescia (close to Venice). It was probably owned by a number of Jews in Italy in the 16th and 17th centuries, as marginal inscriptions in Hebrew suggest. A certain 17th century owner has even left his name in the book: Samuel Hayyim. This volume, too carries Adler’s provenance note in Latin which gives both the bibliographic details and Adler’s name, dated to 1786 in Copenhagen. It is likely that Christ Church bought the copy in the 19th century, perhaps with the sale of the duplicates from Oluf Tychsen’s library and a number of books that used to belong to Theodor Hartmann. Oluf Gerhard Tychsen (1734-1815) was a German Orientalist and Hebrew scholar. Tychsen had a large Oriental library that is currently kept at the University of Rostock in Germany.28 Notably, Adler was one of Tychsen’s students and it is possible that books from these two German private libraries came to Christ Church at the same time (probably later in the 19th century) with Hebrew books that bear Theodor Hartmann’s signature. Anton Theodor Hartmann (1774-1838), Adler’s and Tychsen’s contemporary, was too a German Orientalist and theologian at the University of Rostock.

Curiously, another edition of Hebrew incunabula has been listed in the handlist of Hebrew books at Christ Church, namely the book with the shelfmark MF.1.6. It is thought—for some strange reason—to be the 1489 print of Moses ben Nahman’s Commentary on the Pentateuch. This title was printed three times as an incunabulum: first, between 1469-73 in Rome by the printers Obadiah, Manasseh and Benjamin of Rome; second, in Lisbon in 1489 by Eliezer Toledano, and the third time, in Naples in 1490 by Joseph ben Jacob Ashkenazi Gunzenhauser.29 The copy at Christ Church, however, does not correspond to any of these first three editions but I have identified it as an incomplete copy of the 1514 Pesaro print of Moses ben Nahman’s Commentary on the Pentateuch.30 At this stage of research, it is hard to know whether at Christ Church there ever was a copy of Lisbon or Naples’ edition of Commentary on the Pentateuch by Nahmanides; but if not, it is perplexing to see what could have led to such a misidentification by my previous colleagues who have rarely made such bibliographic mistakes.

While the majority of Hebrew incunabula in Oxford come from early modern Hebraica libraries, the copies at Christ Church arrived later, thanks to the college’s systematic collecting of Hebrew books.31 Such a late arrival of this material would probably also explain the lack of any signs of these books being used in Oxford (for instance, annotations in English in late 19th century hands etc.). And although some time has already passed since these books were acquired, it is to be hoped that they won’t remain the last additions to the wealth of Hebrew incunabula in Oxford as more and more fine copies of incunabula turn up for sale in auctions.

Rahel Fronda
Christ Church & Bodleian Library

Dr Fronda is Deputy Curator of Hebraica and Judaica at the Bodleian Library. At Christ Church she catalogues and researches the provenance of early printed Hebrew and Oriental books. She is the author of Jewish Books and Their Christian Readers: Christ Church Connections (Christ Church, 2017).

William Blake’s Rolling Press at Christ Church

At the far end of the West side of the Upper Library at Christ Church is a beautiful and intriguing machine. It has been there for a while, but not just to adorn the space. As a result of the popularity of the “Gutenberg” letter-press classes during the past years, we have been given the opportunity to continue the series of printing workshops with an exact replica of a wooden eighteenth-century star-wheel rolling press, the only one of its kind in Britain, like the one known to have been used by William Blake, and other engravers like William Hogarth, James Gillray, William Sharp and Jean Pierre Simon before the advent of the cast iron rolling press in the 1820s. It was on a rolling press like this that Blake famously printed his illuminated books, Songs of Innocence and of Experience, The Marriage of Heaven and Hell, and Jerusalem. (Editor’s note)

27 For more details on ISTC, see https://data.cerl.org/istc/ib00525540
28 More information can be found on the web http://www.haraldfischerverlag.de/hfv/sammlungen/tychsen_engl.php
29 For full details, see ISTC https://data.cerl.org/istc/_search?query=moses+ben+nahman+perush+ha-torah&from=0
30 There is a copy at the Bodleian of the Pesaro edition; the shelfmark is Opp. fol. 264.
31 That is true for the incunabula that are now at the Bodleian but also at Merton College Library, where the incunabula were given by its former 17th century member Robert Huntington.
William Blake’s Rolling Press at Christ Church

The press in the Upper Library. Photo David Stumpp.

William Blake Apprentice & Master opened at the Ashmolean Museum in December 2014. The focus of the exhibition was Blake’s life and work as an artist-printmaker.1 This included the method he invented of etching both word and image together that he called ‘Illuminated Printing,’ with which he produced, amongst other works, the Songs of Innocence and of Experience and The Marriage of Heaven and Hell. A further development of his method was the monotype, or colour-printing method was treated with the most innovative and spectacular being the Large Colour Prints of 1795. A striking feature of the exhibition was the recreation of Blake’s printmaking studio, at No. 13 Hercules Buildings, Lambeth, where, between 1791 and 1800, these works and many others had been printed on Blake’s own copper-plate rolling press.

The centrepiece of the studio was a replica of Blake’s wooden star-wheel rolling press. The type and dimensions of Blake’s press were researched so that an exact replica could be built. Following the exhibition, the long-term plan was for the press to be set up and used in the cottage that William and Catherine Blake lived and worked in from September 1800 for three years, in the West Sussex village of Felpham, that still survives, where a re-creation of Blake’s printmaking studio there is envisaged. The cottage was purchased by the Blake Cottage Trust and awaits the funds needed by myself and my fellow trustees to carry out its restoration. In the meantime, while visiting the exhibition, Dr Cristina Neagu and her colleague, Alina Nachescu, asked if it might be possible to have the press on loan and set it up in the splendid Upper Library at Christ Church, where it could be kept safely and used for talks and demonstrations until Blake’s cottage was restored. A promise fulfilled for which I remain enormously grateful.

The following is an account of the evidence that made a re-creation of Blake’s printmaking studio possible, and in particular, how the type and dimensions of Blake’s press were established. Using this research, it became possible for an exact replica of Blake’s press to be built, by the master craftsman, Josh Howard-Saunders, of Bates and Lambourne, Milton Common, Oxfordshire.

No. 13 Hercules Buildings, Lambeth

Between the end of January and beginning of March 1791 William and Catherine left No. 28 Poland Street and moved south across Westminster Bridge to a terraced- or row-house at No. 13 Hercules Buildings in the then small village of Lambeth. It was here that Blake produced the majority of his books in ‘Illuminated Printing,’ as he described them, and developed his revolutionary method of colour printing.2

In 1918 the entire terrace of Hercules Buildings was razed. However, in London’s Guildhall Library a survey of Hercules Buildings was found that had been carried out in the 1860s, showing No. 13 (re-numbered No. 23) and the adjoining houses that make up Hercules Buildings.3 The survey provides a footprint of Blake’s house with exact measurements that make it possible to establish the dimensions of the two rooms on the ground floor, one front and one back; together with the passage at the right leading from the front door to the stair at the rear, that leads to two upper floors and down to the kitchen, and to

---

1 For details and illustrations of the exhibition, see Michael Phillips, William Blake Apprentice & Master (Oxford: Ashmolean, 2014).

2 The previous occupier of No. 13 Hercules Buildings was William Clay, who was still in occupancy ‘a few days’ before the Evening Mail reported on 26 January 1791 that his housekeeper had stolen his household furnishings. Blake is first recorded as a payer of the poor rates for 13 Hercules Buildings on 9 March 1791 making clear that William and Catherine moved to Hercules Buildings between the end of January and beginning of March 1791. See, Angus Whitehead, ‘Mr CLAY of Hercules Buildings,’ Blake An Illustrated Quarterly, Vol. 43, No. 4 (Spring, 2012), pp. 143-44, and G. E. Bentley, Jr., Blake Records second edition (New Haven and London, Yale University Press, 2004), 744.

the back door opening onto the garden. The footprint shows that on the ground floor only the room at the front was large enough to be used as Blake’s printmaking studio (13 ½" x 12"). Furthermore, a photograph of the front elevation of the house, taken shortly before No 13 was razed, exceptionally for the time shows only one extremely large window on each floor, filling the rooms with light; the house and the one next to it are constructed in the same way, possibly purpose-built for weavers. The number of chimneys indicates that there was a fireplace in each room. At the centre of the ground-floor front room of No. 13 Hercules Buildings would have stood Blake’s star-wheel rolling press.

Reconstructing Blake’s rolling press


The rolling press as it appears in Abraham Bosse’s *De la Maniere de Graver a l’Eau Forte et au Burin* (Christ Church, AG.7.18).

The third edition incorporated modifications that had been made to the rolling press since the first edition of *De La Maniere de Graver* was published in 1645, which, for the English market, had been copied by William Faithorne and first published in 1662 as *The Art of Graving and Etching wherein is express’d the true way of Graving in Copper*; in the second edition, 1702, ‘To which is added, the way of Printing Copper-plates, and how to make the Press.’ Until the advent of the cast iron press at the beginning of the nineteenth century, the design first described and illustrated by Bosse in 1645 was universally adopted. The design of the replica of Blake’s press copied from the third edition of Bosse was further modified to incorporate the features that distinguished English from Continental presses in the eighteenth century, in particular, the shelf between the two cheeks above the top roller.4

Blake’s rolling press was approximately 5 feet in height, with the bed at waist height and the top of the star wheel, or cross, used to turn the rollers, no higher than 6 feet. When Blake left Lambeth in September 1800, and moved to the cottage in Felpham, his press was set up in the largest of the two rooms on the ground floor. In this room, the height of the ceiling underneath the beams measures 6 feet 3 inches.5 To clear the ceiling, when turned, the star wheel would have to measure no more than six feet.

Blake’s was a large press with a bed at least 22 inches (560 mm.) and probably two feet in width (610 mm.). Blake’s engraving of *EZEKIEL*, ‘Published October 27 1794 by W Blake No 13 Hercules Buildings Lambeth,’ measures 18 1/4 x 21 1/4 inches (464 x 540 mm.), in height his largest. An impression of the Second State of the engraving, now in the British Museum Department of Prints and Drawings, has been printed on India paper laid onto wove approximately 21 7/8 x 26 1/2 inches (556 x 678 mm.). On the same press, Blake printed his engraving of *Chaucer’s Canterbury Pilgrims* (1810), his longest plate. A copy of the Second State has been printed on wove paper approximately 19 ¼ x 39 inches (490 x 990 mm.).6

---


5 The ‘roof beams in all ground floor rooms are an average of 1.94 m (6.3 ft.) from floor to ceiling, allowing space for a star wheel rolling press.’ Mark Crosby, ‘The sweetest spot on earth’: Reconstructing Blake’s cottage at Felpham, Sussex,’ The British Art Journal, Vol. VII, No. 3 (Winter, 2006/2007), 50.

To lay pasteboard on the bed of the press large enough for his largest copper plates to be laid down, followed by a sheet of paper to be printed 39 inches or nearly a metre in length, with waste sheets and felt blankets laid over all, and then pass between the rollers, the bed would have required a run of at least a metre, first at one end and then at the other, sufficient to print, turn the blankets back, and lift the impression away printed on paper 990 mm. For this to be accomplished the bed of the press would have to be substantially more than a metre in length and probably up to four feet (1220 mm.).

When built, the press was prepared for printing according to 'Blakes Instructions,' taken down by George Cumberland, whom Blake taught conventional intaglio printmaking, and recorded by Cumberland in his Commonplace Book:

“Blakes Instructions to Print Copper Plates/ Warm the Plate a little and then fill it with Ink by dabbing it all over two or three times. –then wipe off the superfluous Ink, till the surface is clean --- then with the palm of the hand beneath the little finger robbed over with a little of the Ink & smoothed with whiting by rubbing it on a Ball of it. Wipe the surface of the Plate till it shines all over –then roll it through the Press with 3 blankets above the Plate, and pasteboards beneath it next the Plank --Paper may be used instead of Pastboard.”

Blake’s press may have weighed as much as 300 kilos (700 lbs), the weight of the wooden eighteenth-century rolling press (with later metal gearing), now in the Science Museum, South Kensington. In height, Blake himself was less than 5 feet 9 inches, the length of his coffin, and probably stood 5 feet 5 or 6 inches. A star wheel press, of the size and weight needed to print Blake’s *intaglio* copper plates, would have demanded great strength, using one foot to push against the bottom spoke of the star wheel, while at the same time using both hands to pull the top spoke, as illustrated on Plate 18 of the third edition of Bosse’s *De La Maniere de Graver* (1745).

For the exhibition at the Ashmolean Museum, the reconstruction of Blake’s studio was furnished with one workbench located beneath a single large window like the one at Hercules Buildings.

According to a description of the rooms on the ground floor made in 1916, there was dado panelling up to 3 feet and built-in cupboards either side of the fireplace. Printmaking equipment, based upon examples shown in Bosse (1745) and in Berthiau and Boitard *Nouveau Manuel Complet de L’Imprimeur en Taille-Douce* (1831), including replica relief etched copper plates, papers, pigments, and printed impressions, were displayed on the workbench and in the open cupboards.

---

8 The weight of the eighteenth-century rolling press in the collection of the Science Museum, South Kensington, accession number 1912-30, was kindly supplied by Rodger Bridgeman, then Curator, in correspondence, 21 December 1993. ‘As to the weight, the source for this was our Museum record card, which gives it as 6.25 cwt (700 lb.), backed up by Derek’s experience that four strong men could lift it only with the greatest difficulty.’ The press is reproduced in Geoffrey Keynes, *Blake Studies*, second edition (Oxford: Clarendon Press, 1971), 128.
9 For Funeral of Mr. Wm. Blake, a. 5 ft. 9: Elm Coffin covered with black flannel, *Blake Records*, second edition, 460.
11 Diagrams showing equipment used in English printmaking studios are printed in Berthiau and Boitard, *Nouveau Manuel Complet de L’Imprimeur en Taille-Douce* (1831).

According to Samuel Palmer, Blake kept an impression of Durer’s *MELENCOLIA I* next to his engraving table. Accordingly, an impression from the collection of the Ashmolean Museum was close-framed and hung above the workbench.

Michael Phillips

Michael Phillips was guest curator of the major exhibitions of Blake at Tate Britain (2000), Metropolitan Museum of Art (2001), Petit Palais (2009) and, most recently, his exhibition and catalogue, *William Blake Apprentice & Master*, at the Ashmolean Museum, Oxford (2014-15). He has also trained as a printmaker in order to research Blake’s graphic techniques used in producing the illuminated books, that he is now able to re-create (http://williamblakeprints.co.uk). An archive of his research forms part of the Rare Book and Special Collections Division of the Library of Congress, Washington, D. C., in association with the Lessing J. Rosenwald Blake Collection. Michael has given talks and demonstrations using the replica of Blake’s press in the Upper Library at Christ Church, the next will take place in the Autumn 2019.

IN THE FOREST OF THE NIGHT:
Building William Blake’s Printing Press

Being involved in making the printing press for the recreation of William Blake’s Lambeth studio in the Apprentice and Master exhibition at the Ashmolean Museum in Oxford has been a highlight of nearly twenty years of furniture making. At Bates and Lambourne we have been fortunate to have been involved with a number of projects at the Ashmolean since its major refurbishment in 2009. Generally however, ours has been a supporting role, making stands and plinths that hold up the objects themselves. With the printing press, our work has the spotlight directly on it.

There are almost no original presses of the period still in existence, and of the few that do survive, my understanding is that none remain in a working condition. By contrast, the cast iron presses that superseded them are relatively common. In part I imagine that they survive because they are younger, but also being iron rather than wood makes them impervious to the worms and beetles that have eaten up many a carpenter’s labours over the centuries. Furthermore, they are harder to chop up when the nights are cold and the log store empty, and like any obsolete technology, the wooden presses will have suffered a long phase of disregard when they would have been considered neither use nor ornament. There would have been no notion of ‘retro-chic’ to save them.

Prior to our involvement, exhibition curator Dr Michael Phillips had amassed many period drawings and a number of other helpful images, some in the form of cartoons of the time depicting the sweat and grunt of the print room in full roll, others technical drawings and exploded diagrams of great intricacy. In the Science Museum’s vast storehouse in Wiltshire, an original was dusted off, visited, and measured. Discussions were had with curators at the Rijksmuseum in Amsterdam who have another reproduction wooden roller press.

When we were handed the project, we were also presented with most of the materials for its construction, in the dismantled form of the former bell frame of St Mary’s Church, High Wycombe. This fine resource had coincidentally been collected by the Building Services team at the museum, from our near neighbours Lassco, experts in architectural salvage. By the time it came anywhere near my machine shop, I am glad to say that Mark and Paul had done a very thorough job of removing all (or almost all, I discovered later) of the various metalwork from its previous incarnation. Using reclaimed timber is a perilous business which I would only recommend if the material in question has an intrinsic value beyond that of the material itself. Its

---

greatest value is usually that which it gives to the saw-doctor in broken saw-teeth and planer-knives.

Having said that, even new planks can hide all manner of metal shrapnel, occasionally literally, but also the odd staple that held the barbed wire that the tree grew round, and not unusually the shotgun pellets that missed the pheasant. Trees have a way of consuming history; our timber merchant claims they once had a trunk that contained an entire bicycle. The use of reclaimed timber does have a long history though. I have seen many a building where there are mortices and draw-dowel holes in the beam-work that have no place in their current function, hinting that it is at least their second incarnation. If you have ever spent any time at the wrong end of a pit-saw (I have not, I am glad to say) I have a feeling that it would sharpen one’s keenness to re-use and recycle rather than cut afresh.

Reclaimed roughed-up components of the rolling press on their way to the workshop. Photos Josh Howard-Saunders.

Having got the wood back at the workshop I began by making an inventory of the pieces I had available and their dimensions. Usually one plans what is to be made, then acquires the wood to suit. In this case, whatever we ended up with would have to have its proportions contained within the limits of the dismantled skeleton of a Wycombe bell-frame. Many of the larger pieces were compromised by fist-sized mortices cut through their length, whilst others were so riven as to be unfit for anything but the firewood bag. Once better acquainted with the wood we could start laying out dimensions. Here we had other guiding lights. Bearing in mind that a key principle of the project was that the press should be fully functional as opposed to merely a representation, it was most important that the bed of the press was at a good working height. One datum set down: Height of the top of the press bed: 900mm, standard kitchen work top height. Another known factor was the size of the plates that Blake would have used. Whilst the Science Museum’s original had a bed width of around twelve inches, Michael was keen to be able to use plates of up to eighteen inches, which gave us our minimum width between the side frames.

Full-size drawing of the printing press.

When trying to get a proper sense of the scale of a piece like the press, there is no substitute for a full sized working plan, which I drew up next, starting with the known ideals and working outwards.

Bamboo rollers and other components awaiting turning.

The blanks for making the rollers at the heart of the press had already been laminated up from a bamboo composite, which although not strictly historically accurate, was as dense and hard a wood material as
I have seen, short of Lignum Vitae, and unlike the Lignum, was relatively easy to source in the appropriate size. As long as the museum was not infested with pandas, all would be well. Once we knew the height of the press bed and the radius of the upper roller, the length of the arms of the starwheel had to be such that they did not hit the floor beneath the press as they rotated. I chose to align them such that at the bottom of their circumferential arc they skimmed the top of the foot of the press. It was very gratifying when, at a workshop meeting Michael told me that he knew the maximum height of Blake’s press because he had measured from floor to ceiling joists in his home at Felpham, a height of six foot three inches. Immediately I laid the tape measure over the full size plan, complete with cardboard starwheel: Six foot and three inches.

Other details were reviewed; the particular curve of an edge moulding, the degree of the entasis on the turned pillars supporting the table frame, the shape of the bolt heads. Having satisfied ourselves that the proportions were correct to Michael’s vision, I drew up the final version of the plans then began roughing out the components. Again, using reclaimed timbers made this a rather wasteful process as I skirted around the worst of the voids and defects. In the end there was sufficient material to build almost the entire press from the belfry stock. The one remaining piece of ironmongery, having lain undiscovered by Paul’s metal detector, was revealed by my table saw in a shower of sparks and no small measure of swearing, on the edge of one side of the principal uprights. It is still there, just visible above the press bed, silver against the black stain of the metal’s corrosion in the old Oak.

In new timber, along with the bamboo composite rollers, for reasons of stability we made the press bed itself from quarter-sawn English Oak. For the starwheel, we decided to use a couple of boards of particularly straight grained and lovely English Ash, a material frequently used for tool handles and oars, not to mention Windsor chairs and the sub-frames of vintage sports cars, thanks to its combination of resilience and flexibility.

Having checked everything worked in a dry assembly, the side frames of the press were then finally glued together and the joints pegged through their tenons for extra strength. The components that fit between the side frames are held by dry mortice-and-tenon joints which are then fixed from the outside by the large square drive bolts that can be seen on the side faces. This allows the press to be dismantled for transport, as well as allowing for the removal of the rollers. A dovetailed rail at each end of the table is then knocked in to help keep the side frames in alignment.

It was then over to Michael to do the fine adjustment of the rollers. Unlike its later cast iron descendants which have screw adjustment, the wooden press is adjusted by use of layered shims of pasteboard and felt, until sufficient pressure is achieved to get a good print. The rollers themselves are held against wooden bearing blocks lined with lead and lubricated with mutton fat. I felt my commitment to the project was proved absolute when, as a vegetarian of 25 years standing, I had to acquire two pounds of freshly slaughtered lamb fat from the local butcher for the modest price of a pound in the Air Ambulance collecting tin. I left the rendering down of this raw material to the very understanding wife of one of my colleagues, however. Commitment has its limits. Once complete, we discussed the finish of the timber; whether or not it should be polished. On the one hand a polished surface would be more resilient to ink and general print room dirt. On the other, this felt more like a piece of engineering than fine furniture, a machine. In the end we decided to leave the wood raw and untreated, to let it be a canvas on which to write the history of its use, taking the impression of its working life as surely as Blake’s prints took the copper plate’s ink. The tree again will swallow history.

Josh Howard-Saunders,
Bates and Lambourne (furniture makers)
www.batesandlambourne.co.uk
CHRIST CHURCH UPS ITS GAME:  
The 'Great Rebuilding' - Christ Church's  
Eighteenth-Century Renaissance

It is hard to believe that Christ Church – never a  
shrinking violet on the collegiate scene - ever felt the  
need to ‘up its game!’ Right from the start, its scale  
was immense and its style grand.  

In 1525, when it was first founded as Cardinal  
College, by Thomas Wolsey, his scheme was for  
buildings and a community unsurpassed in Oxford or  
Cambridge. The dining hall was to match that of  
Hampton Court; its chapel was designed to just pip  
that of King’s College in length; and its quadrangle is  
neearly 250’ square. It would be just about possible  
to put the whole of Corpus Christi, Christ Church’s next-  
doored neighbour, founded only eight years before,  
down into this one quad. In April 1528, Thomas  
Cromwell, in charge of the project, said to Wolsey,  
"Every man thinks the like was never seen for  
largeness, beauty, sumptuous, curious and  
substantial building." But Wolsey never had the  
chance to complete his scheme. He fell from grace  
in 1529 and, while building work continued into 1530,  
the grand design was rolled up and tucked away in a  
corner of the architect’s office never to be seen  
again.

Although Henry VIII refounded the college in 1546 as  
the unique college-cum-cathedral that it is today, the  
place remained a building site for many years,  
muddy and unloved, and very inconvenient with its  
strange mixture of old monastic premises, a partly-  
demolished chapel - now the cathedral for the newly-  
created diocese of Oxford, and only three-quarters-  
complete Wolseian structures. Only the dining hall,  
the kitchen, and most of the senior members’  
lodgings had been finished before Wolsey's fall.  
Everyone else in the huge establishment of 100  
Students, or fellows, commoners, clergy with their  
families, and the college servants lived in a  
dilapidated medieval inn, a run-down former college  
which had belonged to the monks of Canterbury, and  
the remaining buildings of St Frideswide’s priory  
which had been dissolved to provide the site and the  
funds for the construction of Cardinal College.

Over the next century, schemes were considered,  
and some buildings were beautified, including the  
stairs above the stairs to the Hall in the 1640s, but  
events always seemed to get in the way of any major  
work. Not least the Civil War, when the half-built  
portion of the Great Quadrangle was completely  
demolished to provide building materials for the city’s  
defences. It was not until the 1660s, with the  

* A version of this article can also be found in Judith Curthoys, The Stones of Christ Church: The Story of the  
Buildings of Christ Church, Oxford (London: Profile Books,  
2017), pp.119-161.

Restoration and the installation of John Fell as dean  
that any serious new building was considered. Fell  
was responsible for, at last, the final closing of the  
quad, the building of a new residential block, and the  
construction - with Christopher Wren - of the iconic  
Tom Tower.

At the beginning of the eighteenth century, under the  
energetic polymath Henry Aldrich, Fell’s impetus was  
continued when, after a mere twenty years of peace  
without the sound of building and builders, attention  
was turned to grand accommodation for more junior,  
but wealthy, members.

The medieval Peckwater Inn had been acquired by  
Wolsey as part of the site for Cardinal College.  
Initially used to house the workmen and their  
workshops, the Inn soon became an annexe for  
members whose numbers were rising rapidly. In the  
early seventeenth century, the medieval building was  
revamped by Dean Thomas Ravis. The Peckwater  
Quad shown on Agas's 1578 map was soon under  
scaffolding, and the whole quad completed in a  
Jacobethan style within only eighteen months or so.

But the numbers of gentlemen commoners continued  
to rise, and tastes began to change. Within a  
century, the domestic appearance had fallen out of  
favour. Oxford had been considered a “Gothic  
backwater”, but the Queen’s and Trinity Colleges  
soon adopted a classical style, and Aldrich, inspired  
by Palladio, and influential in the major rebuilding  
avross Oxford in both the colleges and the  
University, evidently wanted to make his mark on his  
own college.

In 1706, Christ Church received a bequest of nearly  
£3000 and Aldrich seized upon this as his chance to  
do something grandiose to encourage the wealthy in  
to Christ Church. Three foundation stones were laid  
on Saturday 26 January 1706. All of the Chapter,  
and the noblemen in residence at the time, each  
added a stone to get the building off to a fine start.  
And so, Peckwater Quad was turned into a grand  
edifice - “a serious and academic essay in
classicism”. This was a change occurring all over Oxford; a city that had been predominantly medieval and Gothic in style slowly, under the influence of men of science, such as Christopher Wren, and antiquarian polymaths, such as Henry Aldrich and George Clarke, was introduced to classical architecture.

Out of step with the Baroque style that was popular and evident in new stately homes such as Castle Howard and Blenheim Palace, Peckwater was ahead of its time with its stern and strictly classical use of the Ionic order. Each wing is identical, and give the appearance of an Italian palazzo. The ground floor was rusticated; then the piano nobile and the second floor were given rounded pilasters on the central five bays underneath a grand pediment, and square pilasters for the five bays either side. A balustrade hides the low roof and the cocklofts. Aldrich’s design is a peculiarly English adaption of Palladianism adopted by connoisseurs such as Inigo Jones, something very definitely Italian but “distinctly English”.

View towards the north block of Peckwater Quad, with plan of the south block in the foreground. Christ Church Library, West Table b.15.1).

Most rooms were rather grand. On the first floor were - and still are - large double sets designed for gentlemen. In the attics were more fundamental rooms for servants or for servitors.

Aldrich did not see Peckwater completed. William Townesend, the mason, had probably completed all his tasks, but whether the expensive wainscoting was finally nailed in before Aldrich’s death at the end of 1710 seems unlikely. Internal finishes, such as the wainscoting, or panelling, were the responsibility of the residents of the rooms. This was funded by the ‘thirds’ system: the first resident of the room suffered the full cost but was reimbursed a third by his successor in the room. In turn, his successor paid a third and so on, until the figure reached just £5 when it was written off.

Peckwater Quad was the first outward demonstration of Christ Church’s increasing grandeur. Another great project with which Aldrich has been credited, although he did not live to see this one even begun, was the new library which completed the quad. Aldrich had planned a new building here, probably another residential wing on a grand scale, this time using a monumental Corinthian with a subordinate Doric order. The temple of Bacchus at Baalbek is said to have been an influence on the dean but there were many more, local and further afield, such as the Temple of Hadrian in Rome, Chatsworth in Derbyshire, and the portico at Old St Paul’s.

Judging by the ground floor plan, Aldrich’s building would have had nine bays with an open, central entrance. Two staircases against the south walls would have risen at the east and west ends. The rooms would have been generous, designed for the noblemen that Christ Church wished to attract. The more composed and restrained Peckwater buildings were better suited to the gentlemen commoners. Aldrich’s designs reflected status. It was not until 1716 that a bequest allowed building to begin. Work was to follow Aldrich’s design for the exterior, but it would now no longer be rooms but “the finest library that belongs to any society in Europe”.

A new library had become an essential, rather than a solely desirable, addition to Christ Church’s buildings. The old library, while still magnificent, was a bit dilapidated and furnished with old-fashioned presses and cupboards that were bursting at the seams.

The New Library was planned, not just as a repository for books but, like Peckwater, as a means to encourage wealthy aristocrats to Christ Church. There may well have been an element of competition, too; other colleges (such as Trinity College in Cambridge, Trinity College in Dublin, and All Souls, Oxford) were planning or had recently begun new and magnificent libraries. Under the supervisory eye of George Clarke, successor to Aldrich in his influence on Oxford architecture and who had collaborated with Nicholas Hawksmoor and James Thornhill, and William Townesend, whose skills were employed on numerous buildings around Oxford including All Saints’ church, and the cloister and Fellows’ Building at Corpus Christi College, the building began.

The bold design was a deliberate contrast with the severity of Peckwater, this time based on Michelangelo’s Capitoline palaces, and imitating earlier libraries such as the Wren Library at Trinity College, Cambridge, and St Mark’s Library in Venice. The change of use from residential to library meant
that Aldrich’s planned attics could be abandoned. The ground floor would be a loggia, open to the elements on three sides, and the upper floor would house the library. The façade would be a giant order rather than the purer Doric and Ionic orders of Trinity’s. The beautiful stone staircase was à la mode, reflecting the growing fashion for stone staircases with iron balustrades and mahogany handrails.

An elevation by A.S.G. Butler (1888-1965) of the west end of the New Library, with its Venetian window and Corinthian pilasters. Christ Church Archives.

Construction was funded by gifts from old members. It was a long, slow process - members had, after all, only just been asked to contribute to the re-building of Peckwater Quad. There were years when no money came in at all. Dean Boulter even bought a couple of lottery tickets, but he was not on a winning streak.

By Townesend’s death in 1739, most of the masonry work had been done, and the roof was just about complete. After September 1742, by which time the roof had been leaded and the windows sashed and glazed, work ground to a halt with only £1 17s 3d left in the kitty. Four years went by before the coffers were sufficiently replenished to allow the college carpenters to begin on the timber work.

The New Library: stone staircases with iron balustrades and mahogany handrails. Photo Grey Crawford.

But, even before the shell of the building was completed, the original designs for the interior of the Upper Library were thrown into confusion. The upper room is 142' long, 30' wide, and 37' high, and the original plan was to have shelves at right angles to the long walls, much as they were in medieval libraries and in the more contemporary library at the Queen’s College. But gifts of books had continued to arrive: Lewis Atterbury, the dean’s brother, had given 3000 pamphlets in 1722; Canon William Stratford bequeathed 5000 books in 1729, for which new shelves were built in the old library; and, in 1731, not only 2,500 books, but all the scientific instruments belonging to Charles Boyle, the fourth earl of Orrery, were given to Christ Church. In 1737, the enormous bequest of the archbishop of Canterbury, William Wake, was delivered. Space had to be found for all of these, along with Aldrich’s collection of books and music, which had already caused a major upheaval in the old library.

These huge bequests prompted a re-think; the shelves were now to be placed against the walls, rather than at right-angles; in consequence, four of the seven windows were blocked up on the inside. This seems an odd thing to do, and it has been suggested that this provided additional space for the
new books. These seems unlikely and a second idea is that the new bequests were so grand, and with so many artefacts as well as volumes, that the medieval shelving style was abandoned to create a space for display and to turn the library into more of a ‘cabinet of curiosities’.

Funds for the decoration of the Upper Library were pulled in by David Gregory, first treasurer and then dean, and the work was done by two London carpenters, George Shakespeare and John Phillips, who worked with the rich and unvarnished Norwegian oak to produce the pedimented bookcases in the Ionic order, and the gallery. A local craftsman, Thomas Roberts, who beautified the Senior Common Room at St John's College and the Radcliffe Camera, was responsible for the elaborate plasterwork, including the staircase ceiling, the decoration under the gallery, and the remarkable ‘trophies’ - the drops of scientific and musical instruments, celebrating and complementing the collections of music and Orrery’s scientific and astronomical instruments.

The three men together produced a design of Rococo exuberance, with overtones of Grinling Gibbons, in sharp contrast to the restrained classical exterior. In 1762 and 1763, the finishing touches were added: the engraving of the Christ Church arms for bookplates had been commissioned, and inkstands purchased ready to stand on the five new mahogany desks. Thomas Chippendale’s stools and George James's matching steps had been brought from London, matting had been laid, locks were installed, the painter had finished - even in the little south-facing rooms, and the mahogany rail on the stairs had been fitted by George Shakespeare. The statue of John Locke by Rysbrack was already standing on the library stairs. And finally the whole library was cleaned and dusted ready to receive the books.

But events prompted another re-design. General Sir John Guise, who had left Christ Church in 1702 and become a professional soldier serving with Marlborough, was an avid acquirer of Renaissance art. Just as the library project was nearing completion, his extraordinary collection, consisting of 258 pictures and over 900 drawings, was given to Christ Church.

A brave decision was made to close in the fashionable open loggia and create a gallery, and it was Henry Keene, surveyor to the Dean and Chapter of Westminster Abbey, who was given the challenge. Keene was a Gothic revivalist, influenced by the architecture of the abbey, but most of Keene’s works in Oxford were classical in style. At Christ Church he had little choice in his adaptation of the library. All of a sudden there was upheaval. The archways leading into the loggia had to be converted into windows and doors; floorboards had to be laid where there would have been stone flags; plasterers and glaziers had to be called back. What had been just tidying-up and finishing touches in 1765 took at least another five years. The lower library was far more restrained in its decoration than the Upper, with each side divided into three compartments separated by short walls and Ionic columns. Bookcases, decorated with simple Greek designs, were placed around parts of the walls with space left for the pictures. The ceilings were the embodiment of simplicity compared with that on the upper floor.

The ground plan of the whole of Christ Church as the library was going up was recorded by William Williams in the early 1730s, as one of a series illustrating the Oxford colleges.

The plan shows what remained of the old Canterbury College, which was the next project in the great rebuilding of Christ Church. Soon after the library was completed, attention was turned to this medieval survivor.

The west side of Canterbury College was lost in the early eighteenth century, under the east end of the New Library. But the complete rebuilding, to bring Canterbury Quad to the same level of grandeur as Peckwater and the Library, was begun in 1773 thanks to a gift of £1000 from Richard Robinson, the archbishop of Armagh. Robinson, first baron Rokeyby, had been an undergraduate at Christ Church from 1726 and, on leaving Oxford, had risen rapidly through the church. The architect chosen by the Chapter was James Wyatt. Wyatt, whose buildings combined refined decoration with new constructional techniques, exactly in accord with the industrial and aesthetic mood of the time, had designed the Radcliffe Observatory in 1772 which had marked the beginning of nearly forty years predominance over Oxford's architecture.

Two years later, Robinson gave another £1000; both gifts funding the construction of most of the north and part of the south sides. Much of this work was completed by 1775. The design of most of the small quadrangle is simply elegant, astylar, designed almost to frame the grand library occupying its west side.

The old gate into Oriel Square, illustrated by Malchair, was not replaced by the magnificent triumphal arch, in uncompromising Doric, until 1778.

It is, possibly, too grand for its location, with its southern end - even in the eighteenth century - tucked away behind Corpus Christi, now ignominiously in that college's car park. Its design was, however, a first; fluted baseless Doric columns had been used for interiors, but not on the outside in England before this. One critic described the gate -
one of the last classical constructions in Oxford before the revival of Gothicism - as a ‘pompous absurdity’.

Canterbury’s south-west corner, abutting the gate to the deanery garden, which matches Peckwater exactly in its exterior design, was not begun until early in 1783. There must have been great excitement on 31 March 1783 when a skeleton “of very large dimensions,” wearing boots and buried with coins of Edward I was uncovered about three feet below the ground during the digging for the foundations of the south side. This corner alone cost £4000, funded entirely by the munificent archbishop, on the condition that it was used only by undergraduates of the highest social standing. The dean was constantly requested by the Chapter to write thank you letters.

Peckwater and Canterbury Quadrangles were now grand enough to draw young men from wealthy and influential circles, and the New Library was a major boost to Christ Church’s academic facilities, but there was another attraction for those with enquiring minds. As the Library was finished, so the construction of the Anatomy School in 1766/7 put Christ Church head-and-shoulders above other colleges in its science teaching.

Dean David Gregory had drastically overhauled the curriculum in mathematics and science, and John Freind had made a bequest of £1,000 for the creation of the school and the foundation of a readership in anatomy. Freind’s gift alone was insufficient, but it was supplemented by Matthew Lee, a graduate in medicine from Christ Church who became a royal physician, and who, in his will, left over £20,000 specifically for the advancement of Westminster Students, and to assist with the construction of the School. Public human dissections were to take place twice a year, for which most spectators had to pay a fee. The project was supervised by the dean, and a decision was soon made to put this new detached building in School Yard, just to the south of the Great Quadrangle, near the kitchen. It is a simple, astylar – almost scientific - box with unembellished sash windows, and plain parapet. Only the staircase to the ‘ground’ floor has any decoration in the form of a small portico.

Peckwater and Canterbury Quadrangles were now grand enough to draw young men from wealthy and influential circles, and the New Library was a major boost to Christ Church's academic facilities, but there was another attraction for those with enquiring minds. As the Library was finished, so the construction of the Anatomy School in 1766/7 put Christ Church head-and-shoulders above other colleges in its science teaching. The school rapidly became known as ‘skeleton corner’, with cadavers from the prison used for anatomy teaching. The Oxford Journal of 24 July 1790 records that 'In the afternoon of Monday the bodies [of Shury and Castle, executed for the murder of David Charteris] were conveyed in a cart to the Anatomy School at Christ Church, where Dr Thomson, the Reader in Anatomy, next day gave a publick lecture on the two bodies...' A plan of about 1840 shows the school as it was before alterations were made after the building of the University Museum with tiered seating around a central arena, and a gallery for more spectators.

In the century between 1700 and 1800, Christ Church underwent huge changes. It had always been grand but it became gentrified to a new level. It was the beginning of the era of aristocratic Christ Church but also the era of its dominance as a place of academic excellence. It had upped its game in every way.

Judith Curthoys
Christ Church

PER ARDUA AD EXCELLENTIA: Lord Portal’s Hawking Diaries

I am delighted to have been invited to contribute to this newsletter on behalf of the British Archives of Falconry, an organisation dedicated to preserving tangible records of, and disseminating information on, Britain’s falconry heritage. From an academic perspective, references to this cultural phenomenon dating back over 5,000 years occur in all manner of disciplines from art history to ethnography. Our work has thus seen us offer practical perspectives on the work of academics on subjects as diverse as Ancient Chinese art, Renaissance European literature and, bearing in mind some of the holdings of Christ Church Library, references to hawking in versions of the Babylonian Talmud and other Jewish religious writings. However, our specific focus on British falconry and falconers led to my visit on 18th February with fellow BAF Joint Director Paul Beecroft to examine Lord Portal’s hawking diaries.

Following on from recent newsletter articles¹, Charles Frederick Algernon Portal himself needs little introduction. It may be that, to many, his interest in hawking was just an interesting aspect of a fascinating character. To the falconer, it makes a significant figure in British history feel all the closer – “one of us”, sharing the same thoughts, emotions, highs and lows that all falconers experience irrespective of background. However, given his wider national importance, study of Portal’s hawking diaries transcends the intrinsic interest of researching the sport enjoyed by a fellow practitioner. In order to assess his diaries’ true value, it seems appropriate to add a few notes on falconry itself.

Although frequently linked in the modern world to flying demonstrations at shows and scaring pest birds from airfields and public buildings, true falconry is the art of hunting wild quarry with a trained bird of prey. Whilst redolent of Renaissance regents and Medieval monarchs, falconry thrives today as not just an ancient hunting practice, but a lifestyle which brings its practitioners into close communion with nature, developing a love for the natural world and traditions of practical falconry, passed on by word of mouth from professional to professional, often being handed down from father to son.

With a history in Britain going back at least as far as 675 AD, and as a pursuit linked to the social classes with the time and resources to practice it, it is perhaps unsurprising that many falconers have studied at Oxford since the earliest days of the University. Given the great fervour it inspires, falconry was often seen as a distraction from more serious matters by social commentators and its practice by members of the religious and academic communities was somewhat frowned upon. John Skelton (fl. 1480), created Poet-Laureate by the University (and holding simultaneous credentials from Cambridge and Louvain) wrote a poem, Ware the Hawk, satirising clerical involvement, whilst Bishop Fox’s Statutes for Corpus Christi College, given in 1517, specify that:

Although his active hawking career was over by the establishment of the British Falconers’ Club in 1927, Portal was one the Club’s founding members. At this time, practicing falconers were few and far between and knowledge was scarce. A centuries-old tradition of practical falconry, passed on by word of mouth from professional to professional, had all but died out by the early 19th century and most were dependent on books – many dating back to the Jacobean era – for information. Consequently, one of the BFC’s early aims was to found a library for members’ use. Aside from Oxford’s obvious reputation as a centre of learning, a good many of those early members studied at the University and so the library was housed here until last year. Portal left most of his papers, as we know, to Christ Church, but two of his hawking diaries went to the BFC library which, in July 2018, was moved from the Radcliffe Science Library to the British Archives of Falconry’s facility. This move coincided with Paul Beecroft’s initial enquiries into Portal as part of his research which concentrates predominantly on falconers who saw wartime service during the 20th century. Having more regular access to the diaries stored on behalf of the BFC facilitated more in-depth research though we were aware of additional volumes at Christ Church. On visiting to examine these, just the most cursory look demonstrated their value to not just our relatively small and close-knit community, but perhaps to a greater understanding of Portal himself. However, before looking in more depth at the value of the material held at Portal’s alma mater, it might not be out of place to consider his career in the wider context of falconry at Oxford, which may be a revelation to some readers.

With a history in Britain going back at least as far as 675 AD, and as a pursuit linked to the social classes with the time and resources to practice it, it is perhaps unsurprising that many falconers have studied at Oxford since the earliest days of the University. Given the great fervour it inspires, falconry was often seen as a distraction from more serious matters by social commentators and its practice by members of the religious and academic communities was somewhat frowned upon. John Skelton (fl. 1480), created Poet-Laureate by the University (and holding simultaneous credentials from Cambridge and Louvain) wrote a poem, Ware the Hawk, satirising clerical involvement, whilst Bishop Fox’s Statutes for Corpus Christi College, given in 1517, specify that:

“In order that all pursuits which are adverse to literary study, and which lure men on to take such pleasure in them as is wonderful and past belief, to which when over-much abandoned, they forget their reputation and true interest . . . no Fellow, Scholar, or Student, or Minister of the Chapel of our College, shall be given to hunting and hawking, or keep or breed a hunting dog or stoat (a ferret they call it) of any kind, hawks of any sort . . . within the College or abroad.”

How far such statutes prevented Oxford falconers from keeping hawks is hard to tell, but there are certainly instances of falconers keeping hawks in their accommodation unofficially. One more recent falconer who did was Captain Robert Nairac, GC – sadly best known for his execution by the IRA in 1977. Whilst studying at Lincoln College, he “kept hawks in this college room and would try to strengthen his nerve by putting a small piece of raw steak on the bridge of his nose and allowing one to swoop and take it.” Prior to this, in his final year at Brasenose, John Buchan, later Lord Tweedsmuir, fell foul of his landlady who discovered a goshawk and peregrine sat on the backs of chairs. These were flown by his friend and falconry mentor Kim Muir who was visiting him, and almost led to Buchan’s eviction. Buchan had a further impact on Oxford falconry, albeit a short-lived one. Son of the author of *The Thirty-Nine Steps* (the hero of which, Richard Hannay, was described as having practiced falconry), he founded the Oxford University Falconry Club in 1930. The Club itself was described by Buchan himself as “one of those ephemeral associations which had a dinner and a tie” and boasted some 28 members, including a number of leading contemporary falconers, at one point, but was not especially active in the field, save for odd excursions with Buchan’s famous goshawk Jezebel.

Christ Church College itself counts many falconers amongst its alumni. Aside from Portal, these include Lord Lilford, the celebrated 19th Century ornithologist and falconer, and, more recently, John “Jack” Mavrogordato. “Mavro”, as he remains known to practitioners in those early years of the 20th century.

A lesser-known earlier falconer, Erlysman Charles Pinckney also came up to Christ Church in 1891. Another subject of ongoing research, we were amazed to find that he was mentioned in Portal's diaries since, to the best of our knowledge, Erlysman and his brother John had both stopped actively hawking in the 1890s. Portal mentions taking his hawks to them in April 1912 and subsequently mentions the professional falconer John “Jack” Frost, who was employed for a while by the Pinckneys. It seems that Portal had taken his hawks to Frost, via the Pinckneys, to moult during the spring and summer months: an earlier entry from May 1911 shows Frost to be looking after Portal’s peregrine *Comet* at that time. This in itself, whilst relatively meaningless to a non-falconer, yields an interesting insight into the networks between the handful of practitioners in those early years of the 20th century.

It is hard to fully express the significance of Portal’s actual hawking career without delving into detail which the non-practitioner might find confusing and tedious. He was intensely interested in birds, especially birds of prey, from a very early age and submitted an impassioned and erudite article on their preservation to *The Field* in 1905, aged only twelve. Two years after this, a chance encounter saw him meet renowned falconer Gilbert Blaine, and his professional falconer Richard Best, on the Berkshire Downs. Blaine invited Portal to watch his falcons fly a second time, and thus the young boy commenced a lifelong passion, throwing himself wholeheartedly into falconry with drive and determination. He kept hawks and pursued the sport actively at Winchester College, where he fell from favour with the new headmaster – somewhat understandably so, having spent 20 out of 28 days at the start of Spring Term, 1911, hawking: had the weather been better this would have undoubtedly been more! Coming up to
Christ Church in October 1912, it appears he continued hawking as ever, until war intervened with both sport and study. Little needs to be said here of his Great War service, save for that he attributed his survival to observing how falcons and their quarry interacted and that the courage, innovation and drive essential for success in the field stood him in good stead on active service. Resuming hawking after the war, he went from strength to strength and became a leading member of the still small band of British falconers. RAF Cranwell was fairly convenient for him – the large open fields of Lincolnshire which later lent themselves to runways for his four-engined bombers made ideal flying grounds for merlins and peregrines alike – but his 1922 posting to the new RAF Staff College at Andover was an especially fortuitous one.

Since 1864, the Old Hawking Club, founded by members including Christ Church alumnus Lord Lilford and Maharajah Dhuleep Singh, had been the mainstay of British falconry, pursuing flights at rooks for their dazzling aerial spectacle over a vast area of Salisbury Plain. Such flights were followed avidly on horseback in the spring months although by 1912 increased military training areas and the use of barbed wire restricted the use of horses. By 1922 the OHC was beginning to wind down, hawking more from cars (which limits the ability to follow flights that, typically, firstly go very high and then very far, very fast!) but, stationed at RAF Andover, Portal was able to enjoy the last years of the club at that point was managed by his friend and mentor Gilbert Blaine. Alongside this, he formed a successful hawking partnership with Major Stanley Allen, with whom he acquired rights to 3,000 acres of prime partridge hawking ground near Shrewton in Wiltshire. His 1922 season was a tremendous one, with his female peregrine, *Sibella*, amongst the best-recorded game hawks of recent times. However, tragically and despite expert care, both his partridge hawks died in spring 1923 from a condition for which veterinary science had not yet managed to find a reliable cure. He was then posted to London, obviously rendering personal involvement in active hawking impossible, and from then on it was his RAF career, rather than his hawks, which took flight. Whilst he undoubtedly enjoyed odd days with others’ hawks, perhaps those of the OHC, and was an enthusiastic supporter of the BFC which formed after the OHC ceased operations, he wisely chose to avoid keeping his own hawks when he could not fly them to the high standard to which he had become accustomed.

Portal out with a rook hawking party which includes his mentor Gilbert Blaine. Portal’s rank here, Major, suggests this was taken just after his marriage in 1919 before the RAF’s rank structure changed, when he became Squadron Leader. This was before he resumed keeping his own hawks but was clearly enjoying sport with the Old Hawking Club.

Falconry is, by definition, an art since in its many forms it allows great scope for aesthetic interpretation of what each individual falconer sees as the essence of the “perfect” flight. Some delight in their hawks’ success on the most basic level – putting quarry in the bag – yet this is often more about fulfilling the hawk’s needs. Even in this simplistic way, the object of the whole exercise is to witness the interrelation of hawk and natural quarry under fair conditions within the environment, and the relationship between all actors in the drama; the teamwork between hawk, human and often dogs too. For others, nothing compares with a “high flyer” (hence the modern connotations of that phrase). Their hawking centres around the height to which a falcon flies, lost to sight, before a vertical stoop to earth that stuns, often literally, almost all the senses. Others still seek a dramatic aerial contest with a shifty quarry such as a rook evading the machinations of the hawk in the upper air. Whatever makes the individual falconer tick, once this is achieved with consistency (a happy occurrence seldom attained) the parameters change. The goshawk may be directed at more challenging quarry that requires greater dexterity to bring to bag, the falcon expected to fly higher still, or the whole team to orchestrate the flight more effectively. Consequently, like all artists, true falconers seek excellence, and Portal was no exception. Where he was exceptional was that he achieved it. Examination of his diaries, on initial reading, shows what many modern falconers might consider an almost ruthless streak. Certainly in his early

---

6 Recent times in falconry terms, at least. Roger Upton, *A Bird in the Hand: Celebrated Falconers of the Past* (London: Debrett’s Peerage, 1980), p.156. Indeed, three of Portal’s hawks feature in the list of outstanding hawks in this book. It is fair to say that whilst some hawks naturally have skills which make them more effective, as one might expect in terms of natural selection, what makes a truly outstanding trained hawk is having ample opportunities to fly and hunt. Time and effort put in are what count, which speaks volumes of Portal as a falconer.
hawking, primarily with merlins, he went to great lengths to ensure his hawks succeeded, perhaps refreshing quarry that had evaded the hawk, and had correspondingly high ratios of kills to flights undertaken. This is quite unusual in hawking though, in his defence, he was using wild taken young “eyass” merlins which, when taken from the nest (for there was no domestic breeding of hawks in his day), were yet to develop their flight feathers. The merlins would then learn to fly, undertake training, be flown for a brief season (generally late July to early September – therefore suited young Portal’s academic holidays) then would conventionally be deliberately returned to the wild in a suitable area where they could survive and breed when mature (other species were kept through the moult for successive seasons). He therefore spared no effort to ensure his charges were fully capable of survival and possibly, one might infer, accepted lower aesthetic standards of hawking to do so. This is not the place to debate controversies over either the ethics of hawking or of military strategy, but is tempting to see parallels in his enthusiastic support of area bombing during the Second World War. Not quite “the done thing” to many minds, but an eminently pragmatic way of hopefully concluding hostilities sooner and, no doubt to Portal’s mind, by avoiding more selective daytime attacks on enemy targets, a method of ensuring the survival of his human charges – his bomber crews.

Some of the hawks flown by Portal: June, one of his best merlins (left), and a peregrine (right).

What of his later hawking? His final full season was devoted, as we have seen, primarily to partridge hawking. There are many methods of taking partridge with hawks, but the classic flight is all about aesthetics. This necessitates the hawk, typically a peregrine falcon⁷ or tiercel (male), to leave the glove and climb upwards, attaining a “pitch” of several hundred, maybe thousand, feet above the falconer and his dogs, before partridge are flushed. Of course, to avoid disappointing the hawk and wasting her efforts, one must be sure partridge are there before putting her on the wing, and so pointers or setters typically locate the quarry first. This necessitates strong teamwork: the falconer, or dog handler, must trust the dogs to play their part and be reliable, neither giving a false indication nor flushing too early; the falcon must be confident in falconer and dogs to provide opportunities for her; the falconer must time the whole thing critically, waiting until the falcon is as high as she will go, ideally, without tiring her and in the optimum position for a vertical stoop as the quarry are flushed. Tangible success is strictly limited in this form of hawking, even with the most accurate and efficient hawks, and true success is measured in aesthetic terms – the beauty of the falcon’s flight. However, this aesthetic ideal is immensely difficult to achieve with consistency when, aside from elements of the team itself, terrain, wind direction, weather and other unknown factors all influence the flight as it unfolds. The falconer must be vigilant and adapt to contingencies as they arise, altering tactics and changing plans in a rapidly changing scenario.

Again, parallels between Portal’s hawking and leadership careers, given the close co-operation and teamwork essential in his later hawking, are hard to ignore. Elizabeth Piper’s article in Volume 10 of this Newsletter mentioned “the consideration shown in the Portal papers of the value of human life, for a good strategy and for one’s allies.”⁸ If we widen “human” to all life, this seems apposite here: such qualities are equally applicable to the hawking field. Despite the taking of life being an inevitable, if less frequent than might be expected, outcome of hawking, when one works so closely with other living creatures (one’s allies in every sense, since they fulfil roles a human cannot) one must have empathy with all life. To the non-practitioner this seems a paradox, but many falconers develop a reverence for the sanctity of life and the environment, and become strong advocates of sustainability in all that they do. Portal’s early hawking career certainly involved large “bags” of quarry but this is balanced by the knowledge that, prior to ready supplies of deep-frozen hawk food, hawks needed fresh food daily and merlins, in particular, thrive on a natural diet compared to one of butchers’ meat. Consequently, Portal’s efforts to ensure his hawks succeeded not only developed their hunting and flying skills, but also sustained them: this was no excess for excess’ sake but his hawks’ needs always came first, even if this meant sacrificing, perhaps, the aesthetic value of their flights on occasion. As Surtees’ fictional Master

⁷ Falconry terminology can be confusing to the uninitiated. All trained birds of prey, whether taxonomically speaking falcons, hawks or even eagles, are referred to conventionally as “hawks” and hunting with them “hawking”. Of what ornithology terms the true falcons (“longwings” to the falconer) only the female peregrine was traditionally known as a “falcon”.

Come with me, reader, for half an hour and see whether hawking is not a beautiful sport. Do you know those crisp October mornings when a bead of dew glitters on every thorn in the pale sunlight, when the air is still and bright and the last wisp of fog is just leaving the valley? Now for the first time you are to see for yourself the “speed of a hawk.” He passes like a shooting star right across the sky and is soon almost over the speeding covey. There is a yet grander sight to come, for, after a few more mighty strokes his wings shut close and he hurls himself, with truly appalling speed, down through the sunlit air. The most wonderful sight in nature, this “stoop” of the Peregrine on its quarry must be seen to be believed. The eye can scarcely follow it, but the ear can hear the high scream of the bell as it pierces the air. The charm of hawking lies not in the well-filled game bag but in its own wildness and beauty and in the co-operation with man, her deadliest natural foe, of one of God’s most beautiful creatures.  

Whilst this, like images from Medieval tapestries, somewhat romanticises the sport, the non-practitioner should be under no illusion that practical falconry is not a physically and emotionally demanding – sometimes even dangerous – pursuit. Where the hawk goes, the falconer must follow, and it requires both a certain dedication bordering on the obsessional and a wide ranging set of personal qualities to enjoy consistent success, however one measures that success. It is a way of life and a constant series of personal challenges more so than a mere sport or hobby, and Portal’s success in hawking explains much about his character that stood him in good stead throughout his life. He certainly had the requisite characteristics in abundance: his combination of tenacity, perseverance, innovation, dedication, humanity and passion, alongside decisiveness, willingness to take risks and an analytical nature was certainly significant in his hawking career, enabling him to fly hawks to a far higher standard, albeit perhaps for a shorter overall career, than many of his contemporaries. Whilst he did at times employ professional assistance, like his mentor Blaine, he was one of the few gentleman amateurs who was capable of training hawks himself to a very high standard.

This portrait (right) was the frontispiece to German falconer-artist ‘Renz’ Waller’s Der Wilde Falke ist Mein Gesell, 1937. This copy was given to Gilbert Blaine in 1937 – the placement of the subsequent BFC library stamp was doubtless deliberate! It shows Goering with a peregrine named, like one of Portal’s, Comet (right). Here similarities cease, for whilst Goering’s interest was superficial, Portal was one of the ablest practical falconers of his day.

Likewise, this was not a man who sent others to war without fully knowing the risks they faced. As all pilots and falconers know, flying is an inherently dangerous occupation, even without the best endeavours of an enemy to send one tumbling to earth, and comparisons between hawking and military aviation are not purely fanciful, Portal’s hawking partner, “Stanley Allen, wrote in his autobiography that: ‘After the war [1914-1918] he [Portal] told me that his experience out hawking […] had been of great assistance to him in aerial combat. In the Battle of Britain I saw wonderful stoops by our pilots and have always thought falconry played some part in our success at that critical time.”

Irrespective of how far Portal’s personal experiences informed the strategies of later pilots, which is debatable, certainly the methods used by wild and trained hawks made sense in combat – use height, speed and surprise and attack from the clouds or from close quarters. The hawker should not be under any illusion that successful falconry was purely a matter of the sport for Portal and indeed all falconers: 

of Foxhounds, John Jorrocks, said: “it ar’nt that I loves the fox any less, but that I loves the ‘ound more.”

Maybe Portal’s single-minded pursuit of excellence through consistent success to ensure his hawks’ immediate needs as well as their future survival carried through to his advocacy of area bombing. His development of a preference for more spectacular flights is more clear cut and an extract from an article he wrote in 1921 reveals the essence of the sport for Portal and indeed all falconers:

<table>
<thead>
<tr>
<th>Footnote References</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 Robert Smith Surtees, Handley Cross; or Mr. Jorrocks’ Hunt (London: Bradbury and Evans, 1854), 130.</td>
</tr>
<tr>
<td>11 Major Stanley Allen cited in Roger Upton, Hood, Leash and Lure: Falconry in the 20th Century (Marlborough: Roger Upton, 2004), 121. This title also chronicles attempts by other British falconers, operating under the Air Ministry, to use trained hawks to intercept pigeons carrying messages from enemy agents (115-121).</td>
</tr>
</tbody>
</table>
It is a curious fact that Portal's adversary, Hermann Goering, another former Great War pilot, also had a fascination with falconry, going as far as to support the foundation of a State Falconry Centre, the Reichsfalkenhof, which maintained a collection of hawks of all kinds. Some claim he came up with the strategy of dive-bombing based on observing falcons stooping through, again, this is probably conjecture. Either way, it must be said that Goering was no true exponent. He enjoyed the romanticism and pageantry he associated with the sport, and liked to be seen with a hawk on his fist, but was no practical falconer. By contrast, Portal preferred his hawks on the wing, not on the glove, taking every opportunity to see them aloft. He kept adequate numbers of hawks suited to his practical purposes, hawks to which he could do full justice, and was not afraid to get his own hands (and knees and clothing) dirty. As practitioners, though few of us today have the opportunities and resources Portal did, and whilst times, practicalities and outlooks have changed, his diaries teach us the importance of dedication and persistence above all. As Portal waged total war against a totalitarian enemy, so the falconer must be totally tenacious in pursuit of the pitch of excellence Portal, and his hawks, attained. A falconer's falconer, and an airman's airman, little wonder, perhaps, that Portal's “hawks” ultimately outperformed Goering's.

David Horobin
British Archives of Falconry

David Horobin is a joint-director of the British Archives of Falconry, which welcomes enquiries from academics interested in all aspects of British and wider falconry’s history, practice and cultural significance. His publications include Falconry in Literature (Hancock House, 2004), Latham’s Falconry: A Commentary (Coch-y-Bonddu, 2012) and ‘The Pen and the Peregrine: Literary Influences on the Development of British Falconry’ in Raptor and Human: Falconry and Bird Symbolism Throughout the Millennia on a Global Scale (Zentrum für Baltische und Skandinavische Archäologie, 2018).

For details about the British Archives of Falconry, see britisharchivesoffalconry.wordpress.com

12 Martin Hollinshead, German Eagle: Fritz Loges – Master Falconer (Staffordshire: Fernhill Press, 2008), pp.18-25. Whilst its origins and purposes were questionable, this establishment was managed by some excellent German falconers, ‘Renz’ Waller and Fritz Loges, who greatly influenced pre- and post-war German falconry, securing it through the difficult years of the Third Reich era when other fieldsports were banned.

The Flower of Spain
A tale of spies and intrigue

In 1942, at the height of the war, a small silk flower made its way from Almeria in southern Spain to Britain's post-Blitz London. It was made by a student by the name of Encarnita Garcia while she was imprisoned at the hands of the Gestapo in Almeria, Andalusia, and smuggled out by two Spanish Republican airmen. No one knows how many hands the flower had to go through to get all the way to its final destination, but the tale is one of intrigue and spies, danger, death, and hope, worthy of many a novel- a tale where fact is as good as fiction, if not better.

The ‘Flower of Spain’, embroidered by Encarnita Garcia.

During the Second World War, while Spain was technically neutral, it still allowed its citizens to fight on behalf of the Axis powers, so long as they were fighting against the Soviet Front, in repayment for the Fascist support which came to the aid of the Nationalists during the Spanish Civil War. However, this didn't stop Spain from allowing the Gestapo to come over the border and to arrest people found guilty of any crime that they saw fit. Even as far south of the country as Almeria in Andalusia. To give an idea, the little flower- barely two inches across- came over the expanse of Europe with a report- both in Spanish and in English, having gone through at least two different intelligence bureaux between Almeria and London. The report detailed at least a part of the dangerous journey that someone must have made, the reports of "Don Din" and "Natura", the aliases of the two Spanish Republican airmen who smuggled the report and flower to a Mrs. Grant, a Spanish Intelligence Officer of the BBC, operating throughout Spain. Herein lies the story of Encarnita Garcia, or "Consuelo" as she was also known.

In the early months of 1942, "Consuelo"- Encarnita's pseudonym- wrote a report to the BBC asking for it to
be read out on air about the plight of the Spanish people. The report wasn’t read out, but her pseudonym was as part of a wider story.

A few months later, Encarnita Garcia and seven or eight (the Spanish and English reports differ here on the exact number) men alongside her were imprisoned by the Gestapo for the distribution of intelligence signals from the European Intelligence Department of the BBC in Spain. There are no records of the BBC having a Spanish presence (according to the BBC archives themselves) so perhaps, as the report says, the charges were completely fabricated- but to what end, it does not know. Those arrested came from all different walks of life- a student, a dockworker, a doctor, a mechanic, a clerk, two soldiers of the assault corps, and were of all different ages.

They were all rounded up and placed inside a nearby fort and imprisoned. Whilst imprisoned, Encarnita managed to weave a small red flower from silk threads- presumably from her clothes that she was wearing. She sought the help from the local chaplain and nuns from around her prison, and the flower was smuggled out of the prison, hopefully to get to the intended recipient- the Chief Marshal of the RAF.

She even had the sympathy of some of her guards who thought that a great injustice had been committed against her and her fellow prisoners.

Later, at 6.30am on the 11th August of 1942, they were shot and killed.

However, having been smuggled out of the prison fort, Encarnita’s flower continued on its voyage across Nazi-occupied Europe.

It managed to get from the chaplain’s hands to Natura and Don Din, then to the Vice Consulate, and the British Consul in Malaga. Onwards from there, it got to the BBC who used Mrs. Grant, a Mr. McCann, and a Mrs. Pickering for the reports and flower to find its target- eventually- in London to its addressee: the Chief of the Air Staff, Lord Portal, with the best wishes and hopes of the Spanish people for a brighter future and for the hope placed into the United Nations.

Lord Portal’s autograph notes about the Flower of Spain.

Despite all of the odds, this bright little red and green “Flower of Spain” managed to fight its way halfway across war-torn Europe to spread a message of peace and hope for the future. For the cause of the United Nations.

Elizabeth Piper
Christ Church

Elizabeth Piper has a background in the Royal Air Force and works on cataloguing the Portal Papers at Christ Church.
Thinking 3D: Towards an Oxford-wide Series of Exhibitions and Events

On February 20th, Christ Church opened the first in a long series of Thinking 3D exhibitions – “The Mathematics of Space”.

Thinking 3D is an international research project which has manifested this year in a series of exhibitions, public lectures, symposia and conferences. The project focuses on the history of communicating three-dimensional concepts or observations on twodimensional media. In 2019, this project, the brainchild of Dr Laura Moretti (Senior Lecturer, University of St Andrews) and Daryl Green (Librarian, Magdalen College), saw its main tent pole exhibition at the Bodleian, “Thinking 3D: From Leonardo to the Present” open in late March, and a whole series of partner exhibitions across Oxford have been stitched together to offer a nuanced look at various facets of this complex topic.

Green and Moretti met Cristina Neagu, Keeper of Special Collections at Christ Church, early on in their exploration of Oxford collections, and knew that the Upper Library would be an excellent and fitting exhibition venue highlighting the work of 17th century mathematicians and astronomers. In November 2017, they visited the Library to see books from the Orrery Collection and to discuss partnerships, the fruits of which were seen in the exhibition and series of talks organized by Neagu this spring.

It was only appropriate, then, that “The Mathematics of Space” was the first Thinking 3D show to open in Oxford, and the second of 2019 (“Under the Skin: illustrating the human body” at the Royal College of Physicians opened on 1 February 2019). “The Mathematics of Space” provided an early spring-board into the Ashmolean’s “Dimensions: The Mathematics of Symmetry and Space” which opened on 16 March and explored the history of perceiving and understanding one, two, three, and more dimensions; and in turn offered the first nuanced exhibition on two of the four major themes of the Bodleian exhibition, geometry and astronomy - the other two Bodleian themes being anatomy and architecture (for details about the Ashmolean exhibition, see next article, by Federica Gigante).

History of mathematics enthusiasts and astronomers could get a taste of the overarching narrative at the Bodleian exhibition, seeing some of the greats (Pacioli, Dürer, Leonardo) and the similar works in Christ Church with a more detailed look at how the works of these individuals influenced the great minds of the 17th century, such as Kepler, David Gregory, and Edmund Halley.

Later exhibitions in Oxford explore the development of illustrating botanical specimens and how modern illustrators still use traditional techniques (Magdalen’s “Thinking 3D: the botanist’s library” and Oxford Botanic Garden’s “Thinking 3D: Flower to Frame”), the latest in 3D imaging in natural history specimens (Oxford Natural History Museum’s “First Animals”) and later in the year an array of College libraries will participate in a one-afternoon open session displaying collections linked to three-dimensionality and history of science.

The exhibition activities in Oxford are complemented by a busy schedule of lectures, symposia and conferences. The exhibition in the Upper Library was opened with a fascinating talk by Peter Grimwood on his work in creating orreries which were either based on historical understandings of the universe or based on scientific fact.

On June 22 the Department of Physics hosted a one-day symposium on this history and cutting edge of astronomy, “Thinking 3D: Space and Time” and in...
A two-day conference on the history of architecture will find its home at Worcester College.

The launch of Thinking 3D began at Christ Church with the display of books alongside functioning orreries and celestial globes, a fantastic way to step into this complex world of the history of communicating the world around us.

The first edition of Joseph Moxon’s *Practical perspective* [...] (London, 1670), Christ Church Library, OR.2.9, with the famous mica pop-up doorway illustrating the observer looking though the picture plane. Photo John Barrett.

As the year progresses, we are so pleased that our partnership took inspiration from that fateful meeting in the Upper Library two years ago.

For more information on Thinking 3D and a full list of exhibitions and events, please visit: https://www.thinking3d.ac.uk/

Daryl Green (FSA)
Magdalen College, Oxford, 2016-2020; Head of Special Collections, University of Edinburgh

Daryl has worked professionally with manuscripts and early printed books for over a decade at York Minster Library, the University of Illinois (Urbana-Champaign), the University of St Andrews, and Oxford. He has taught book history and descriptive bibliography.

His expertise is in the materiality of late medieval manuscripts and early printed books, including bindings, provenance, provincial printing, and the slow and disjointed transition of manuscript culture to the printed book markets. Daryl has curated and co-curated several exhibitions and workshops ranging in topics from the history of science to fine-press printing.

**DIMENSIONS: THE MATHEMATICS OF SYMMETRY AND SPACE**

On the occasion of the 500th anniversary of Leonardo da Vinci’s death, Oxford has showcased a series of exhibitions aimed at illustrating the ways in which artists, scientists, and scholars have approached the concept of three-dimensionality throughout history. The Ashmolean Museum, often identified by one of its most iconic paintings – Paolo Uccello’s hunt, a masterpiece featuring one of the earliest applications of linear perspective and three-dimensional space construction – decided, however, to go beyond the mere discussion of three-dimensionality and venture into the world of multiple dimensions.


The exhibition ‘Dimensions: the Mathematics of Symmetry and Space’ attempts precisely to illustrate, through artworks as well as the latest virtual reality technology, how to visualise and comprehend dimensions that are beyond our most immediate perception and understanding. In order to do so the Museum collaborated with a group of DPhil students and Post-Doctoral researchers from the Mathematical Institute to produce the first collaborative project explaining mathematical concepts through art to have resulted in a major exhibition. “The greatest challenge has been to present complex mathematical concepts in simple terms accessible to everyone but which could still stand the scrutiny of mathematicians”, reflected Dr Joshua Bull from the Maths Institute. The project has been a true revelation for both curators and collaborators. The exchanges in the store rooms of the Museum while choosing the objects were priceless. The same tile spoke of seventeenth-century Damascus as much as of a combination of symmetric patterns, while stone spheres spoke of neolithic Scotland as much as of Platonic solids.

Proceeding along a path through the exhibition, the visitor progressively learns that we are trapped in a 3D world, in that everything we create cannot but be three-dimensional. If the 0th dimension is evidently impossible to visualise, being the absence of any space and movement, one-dimensional and two-dimensional spaces, one learns, are also practical
impossibilities. A one-dimensional space is in fact a line along which one could move only in one direction backwards and forwards. However, no matter how fine one's pencil is, even the thinnest line will always have a degree of width and height, that is, of three-dimensionality - or else we would not see it.

If the same is true of two dimensions - where even the thinnest 2D support, be it a canvas or a piece of paper, would always have an infinitely small degree of thickness - at least the existence of two directions in which to develop a pattern makes the 2D section of the exhibition a more exciting area to explore.

In two dimensions it is possible to create symmetries, and symmetries are the very foundation - both the making and the breaking - of art creation. There indeed exist only three types of symmetry, illustrated in the exhibition through the use of three Islamic tiles but a combination of them allows for a much richer repertoire of patterns.

A wall-full of Islamic tiles brings the attention to the fact that Islamic craftsmen mastered the use of mathematical principles in their artistic production since medieval times.

If it is possible to create symmetrical patterns on a 2D surface, a tile in this case, it is also possible to use 2D tiles to create symmetrical or asymmetrical tessellations. This concept is illustrated by the use of a set of five star and cross lustre tiles made in Iran in the thirteenth century.

Example of tessellations in an Islamic tile made in Iran.

While these tessellate infinitely, infinitely repeating their positions relative to one another, a different set of tiles, invented by Oxford Professor Roger Penrose, also tessellate infinitely without however ever repeating their pattern and relative positions. Penrose tiles, visible in Oxford on the floor in front of the Mathematical Institute, therefore represent a unique example of aperiodic tiling, an unpredictable and fascinating mathematical phenomenon.

By making a shift from the two-dimensional wall of the gallery to a case in the centre of it, the visitor is at this point prompted to move in yet another direction, thus adding, so to speak, a third dimension to his or her visit. The case contains five small carved stone spheres each featuring an increasing number of circles (and triangles) on their surface - four, six, eight, and twelve. The spheres, carved about 5,000 years ago in Orkney, reveal a high level of mathematical awareness on the part of their creators; as to their function, this remains a mystery to this day. What they do show us today, however, is how to place two-dimensional shapes on a three-dimensional solid. Using a map, for example, it is always possible to find one's own position by considering two directions - latitude and longitude - a
characteristic that normally pertains to two dimensions.

From two dimensions in three, the visitor is now encouraged to explore three dimensions in two: that is, the construction of three-dimensional figures and spaces on a two-dimensional support, such as a canvas or a piece of paper. One of the highlights of the exhibition, a series of illustrations taken from Albrecht Dürer’s 1538’s edition of his ‘Measurement with Compasses and Straightedge’ reveals the techniques used by Renaissance artists to transfer a three-dimensional object onto a two-dimensional support in as scientific a way as possible. Through the use of a loupe providing a fixed viewpoint, the artist looks at an object placed behind a grid and faithfully reproduces the position of each element on a gridded piece of paper. Thus three-dimensional reality is transposed onto a two-dimensional surface through the use of a near-scientific instrument. The series of Dürer woodcuts from the Life of the Virgin featuring on the walls illustrates the result of such technique in the masterfully constructed three-dimensional architectural and landscape backgrounds.

The visitor will by now have spent quite a bit of time in the gallery, and time is the next concept with which he or she is confronted. Time is indeed a dimension but, contrary to popular imagination, it is by no means ‘the’ fourth dimension. This idea is here explained through a series of woodcuts illustrating a fraction of a second of film by the contemporary German artist Christiane Baumgartner. The woodcuts recall the technique of the earliest type of animations, made through a series of frames quickly sliding one after the other to create a moving image. The frames, or the woodcuts in this case, are however to be considered as two-dimensional objects which, as a consequence, when moved in time effectively become three-dimensional: that is, $2D + \text{TIME} = 3D$. If this is not how we would imagine three-dimensionality to look, it could help to imagine the woodcuts stacked one upon the other in a block resembling a paper rim, which would look a lot closer to our idea of a three-dimensional object.

As we have now digested the idea that time is not ‘the’ fourth dimension it is probably time to venture into the exploration of a fourth physical dimension. Given that we are, as previously explained, trapped in a 3D world it is no surprise to learn that the only way to interact with a four-dimensional shape is through virtual reality, a digital world where the normal rules of physics do not apply in the same way as in the real world and which can be accessed through the use of virtual reality headsets.

The collaboration between the Ashmolean Museum and the Mathematical Institute thus led to the creation of a virtual reality app which takes the visitor through an exploration of 4D shapes as well as shapes that live in-between dimensions. Just as a 2D creature living in a hypothetical 2D world called Flatland would not be able to see us, as three-dimensional beings, peeking over their world but could instead see our 2D shadows, in the same way our eyes are not able to see a four-dimensional object but we are able to see its 3D shadow in our world. The virtual reality app thus enables us to touch and rotate the 4D shape in a world beyond our reach, allowing us at the same time to witness the way its shadow rotates, moves, and reacts in our 3D world.

At the same time, the virtual reality app allows one to fly inside a shape that exists in neither two nor three dimensions. This shape cannot be made in the real world because its construction is based on the infinite subtraction of parts of its elements. In order to visualise this it is sufficient to imagine a Rubik’s cube composed of 27 smaller cubes. From this, the central smaller cube on each face is removed and so is the middle cube, thus leaving a pierced cube made of only 20 smaller cubes. If we now imagine every single small cube to be itself a Rubik’s cube and we apply to it the same rule of subtracting the central smaller cube from each face as well as the middle one, we see a shape that becomes more and more pierced and comes to resemble a sponge.

Apply this rule infinitely and the shape will become more and more hollow without, however, ever losing its external outlook. This paradox can also be explained by pointing out that, in so doing, the cube’s volume tends towards zero while its surface - infinitely increased by the addition of a further ‘hole’ - tends towards infinity. Taking a ride inside such a shape is not an everyday treat! The reaction of visitors taking off the virtual reality headsets and returning to the real world is summarised in the most common immediate reactions: it’s weird and it’s amazing.

**Federica Gigante**

Dr Gigante is Curator of the Collection from the Islamic World at the History of Science Museum in Oxford. Her research examines the transmission of knowledge between the Islamic world and Europe in the Early Modern period. She curated the above exhibition at the Ashmolean Museum.
“Nature Within the Pages” - Exhibition Highlights

Last year saw record numbers of visitors attend our exhibition, “Nature Within the Pages: Flora, Fauna, Anatomy, and the Rest of the World”. Opened on 12 May and curated by Leanne Grainger, the exhibition explored the important role of book illustration in furthering the spread of knowledge in the natural sciences.

The chosen items showcased the breadth of our collections, with books published between 1549 and 1859 covering topics as diverse as mythical trees, microscopic ‘animalcules’ and Darwin’s voyage on the Beagle. Photographs and macabre itemised accounts from Christ Church’s former Anatomy School (now the Lee Building) also featured in the exhibition. Collectively, the displayed works told a story of increasing scientific rigour, developments in microscopy, and the vital role of professional artists in transmitting ideas to the scientific community.

This volume published in 1849 was presented to Christ Church by Richard Benthall (ChCh Treasurer 1985-1999) in memory of his father, Sir Paul Benthall K.B.E., F.L.S., a field botanist.

Leanne Grainger showing visitors Aububon’s *Birds of America* at the exhibition launch. Photo David Stumpp.

Edward Topsell’s *History of four-footed beasts, serpents, and insects*, published in 1658 (Arch. Sup. F.2.4) details superstitions about both actual and mythical animals. The descriptions and woodcut illustrations are based on the popular claims of the time, and so include unicorns, manticores (see above) and claims such as “Apes are terrified of snails”. Among these, the volume includes the famous woodcut illustration ‘Dürer’s Rhinoceros’ highlighting the marvellous interpretation of an actual animal using only a written description and brief sketch by an unknown artist.

For those who were not able to attend the exhibition, here are just a few of the highlights.

A book containing superb illustrations of plants discovered in the mountains of the Himalayas and in Sikkim, a north-eastern state in India, is Joseph Dalton Hooker’s *The Rhododendrons of Sikkim-Himalaya*. The detailed botanical drawings and descriptions were made during Hooker’s botanical mission there. This copy has also travelled through Sikkim, with the binding showing signs of much use.

However, the inside is in good condition, and has hand-written notes of species found on the trip and their locations.
An Infestation in the Constellations
Insect Damage in Kepler’s Astronomiae Pars Optica

Christ Church Library is a member of the Oxford Conservation Consortium (OCC), which provides conservation and preservation services to a selection of Oxford colleges. A recent visitor to the OCC studio was a handsome volume of Johannes Kepler’s Astronomiae Pars Optica (OR.5.37).

Born in 1571 in Weil der Stadt, Germany, Kepler was a mathematician, astronomer, and astrologer who emerged as an eminent figure in the seventeenth century’s scientific revolution.

Though most famous for his laws of planetary motion—which improved upon the existing Copernican theory by introducing the idea of elliptical orbits—his work on optics was also highly influential. Written in 1604, Astronomiae Pars Optica is one of Kepler’s key texts in the field, and it is due to this volume that he is often cited as ‘the father of modern optics’.

Unfortunately, library pests do not appreciate scientific breakthroughs! When we received the book into the studio, some insects had already feasted on Kepler’s important treatise at some point in the past.

OR.5.37 pp.88-89 before treatment, showing the extent of the woodworm damage.

The first 300 pages (roughly 70% of the text block) were severely damaged, with some sections almost detached and some corner pieces already entirely lost, while the remaining 30% of the text block showed more minimal, sporadic damage. Due to the pattern of the damage, loose ends of paper were also catching on one another, making it difficult to turn the pages.

From the size of the holes and tunnels, the culprit appears to be the furniture beetle Anobium punctatum. Adult furniture beetles are small, dark brown insects 3-4mm long, but it is their larvae that

Emma Sillett
Christ Church, Reader Services Librarian 2017-2020 (now Librarian at Trinity College, Oxford).

Leanne Grainger
Graduate Trainee and Library Assistant at Christ Church 2018-2020 (now Assistant Librarian at St Hilda’s College).

The exhibition also included a rare photograph of inside the Anatomy School (Archives P.TOP.Int.7) taken before the collections were moved to the University Museum of Natural History in 1860. It shows some of the skeletons, fossils and jars of specimens used in teaching.

The Georgian building housing the science laboratory at Christ Church was erected in 1766 in the School Quadrangle, to the south of the Hall. It remained a laboratory until 1942, even after the collections were moved.

A discourse concerning the origine and properties of vwind, by Ralph Bohun (Arch. Sup. G.5.25) is another rare volume selected for this exhibition.

Some natural phenomena, such as wind, may be thought impossible to directly illustrate. Yet, this work published in 1671 contains two engravings depicting whirl winds and tornados, in what is considered the first scientific attempt to present an explanation of weather. Described in detail are the then-existing theories of the causes of hurricanes, “and other tempestuous winds”.

Emma Sillett
Christ Church, Reader Services Librarian 2017-2020 (now Librarian at Trinity College, Oxford).

Leanne Grainger
Graduate Trainee and Library Assistant at Christ Church 2018-2020 (now Assistant Librarian at St Hilda’s College).
do the most damage, targeting both wood and other cellulosic materials—such as the compacted paper that makes up the text block of a book.

Mature female furniture beetles lay their eggs in cracks or existing holes in the material. After roughly three weeks, the larvae hatch. The larvae are only 0.5-1mm long, but they then spend their time burrowing through the material—as they have with this book—and increasing in size. This stage can last for several years as the larvae continue to grow. When they finally pupate into a mature adult, they make their way to the surface and emerge, leaving an exit hole behind.

The aim of the treatment was to stabilise the book for handling while minimising the intervention and time required. Systematically working through the first 300 pages, small splints of RK15 Japanese kozo paper were applied with wheat starch paste where necessary to reattach or stabilise precarious areas to prevent further loss.

Loose ends of paper were bridged, meaning that the pages no longer catch upon each other so readily. Though the insect-damaged pages remain fragile after treatment and must be handled with caution, the book is at much less risk of further damage.

You may be asking how we can stop such damage from happening again. Part of the OCC’s work is to help our member colleges with ‘Integrated Pest Management’—a variety of strategies to monitor pests and prevent them from damaging the collections.

Most pests can be stopped by controlling the environment in which the books are stored. For example, the eggs and larvae of furniture beetles do not survive in conditions where the relative humidity (RH) is below 55%. Christ Church Library and OCC work together to regularly monitor the library’s RH to ensure it does not increase to levels that would allow pests to flourish and, if we start to see problems, we can manage the RH by changing the temperature of a store via conservation heating or by installing dehumidifiers.

This is how we know that the damage to *Astronomiae Pars Optica* must have happened quite some time ago, when the environment in which the book was stored was above 55% RH for an extended period of time.

One last feature of the book bears noting in this article: the charming paste paper covering. Paste paper (‘Kleisterpapiere’) originated in German-speaking areas in the late 16th century. Both vegetable dyes and inorganic pigments were used to create their striking colours, mixed with paste and applied to paper with a brush or a sponge.

The paste was then manipulated while still wet—this could be done with tools and stamps, or even just with the fingers. Unlike marbled paper, which required specialist materials and consummate practice to master, paste paper was relatively easy to make and the materials required were common ones in a bookbinder’s workshop.

The red paste paper cover on OR.5.37 appears to have been created with a three-pronged tool of some kind to create the diagonal patterning and a stamp for the ‘blobby’ decorations inside the diamonds.
Christ Church Library OR.5.37, upper board with paste paper cover, with brush-marks clearly visible.

Further Reading

Johannes Kepler  
Stanford Encyclopaedia of Philosophy: https://plato.stanford.edu/entries/kepler/#OptMetLig  
University of Reading Special Collections Blog: http://blogs.reading.ac.uk/special-collections/2016/03/johannes-kepler-astronomiae-pars-optica/  

Museum and Library Pests  
What’s Eating Your Collection?: http://www.whatseatingyourcollection.com  

Paste Paper  

Jess Hyslop  
Oxford Conservation Consortium  
Jess studied English at the University of Cambridge and Cultural Studies at Birkbeck College, London, before completing a Master’s in Conservation of Books and Library Materials at West Dean College. She was the Project Conservator for the one-year Minton Archive conservation project at the Staffordshire and Stoke-on-Trent Archive Service before joining the team at the Oxford Conservation Consortium in August 2017.

THE LIBRARY ACQUIRES MORE PHOTOGRAPHS BY LEWIS CARROLL

continued from page 1

Sample pages from the photographic album of the newly acquired Sidney Owen collection.

Sidney James Owen (1827-1912) was tutor and reader in law and modern history at Worcester college, Oxford. Owen’s wife was Mary Ellen née Sewell (1835-1928), and she was a trained barrister not in practice. They had eight children, and the older siblings were photographed either singly or in pairs by Dodgson. The children were Sidney George (b. 1858), Lucy “Tinie” O’Brien (b. 1860), Henrietta “Atty” O’Brien (b. 1862-1953), Adelaide O’Brien (b. 1864), Mary Isabel O’Brien (b. 1866-twin), Margaret “Maggie” Emily O’Brien (b. 1866-twin), Edward Cunliffe (b. 1869) and Montague “Monty” Charles (b. 1873).

Most of these photographs were not known when The Photographs of Lewis Carroll, A Catalogue Raisonné was published (University of Texas Press, 2015), but this will be amended when a reprint is made. In the meantime, the image numbers (IN) are given here, but numbers between [ and ] are educated guesses. Three of these photographs have the same image number attributed to them, so fractions are used to distinguish between them, following Dodgson’s usual procedure in such circumstances. The earlier photographs were taken

continued from page 1
at Badcock’s Yard which was just opposite Christ Church in St. Aldates, and was rented by Dodgson between 18 June 1863 and 16 March 1872 for photographic purposes. The later photographs were taken in Dodgson’s photographic studio on the roof above his rooms in Tom Quad (Tom 7:6). Dodgson’s diary reference for 27 June 1863 records: "Photographed the young Owens in the morning…"

1. Lucy Owen, aged 2½, taken on 27 June 1863, [IN-0952], in Badcock’s Yard, Oxford.

This photograph was probably taken at the same time as an existing photograph of Sidney Owen Jnr, (IN-0953), using the same chair.

The photograph of Sidney Owen Jnr, as shown in the Catalogue, is in an album assembled by Dodgson and now located at the University of Texas at Austin. Dodgson’s diary reference for 11 July 1867 states: "Since Commemoration I have been continually photographing and have done some beautiful ones of children - the Owens and the Max Mullers; the former in night-dress, with an actual bed, made several excellent groups."

2. Lucy Owen, aged 6, taken in July 1867, (IN-1643¼), in Badcock’s Yard. Numbered 1643 on plate.

3. Lucy and Henrietta Owen in night-dresses, aged 6 and 4 respectively, in July 1867,(IN-1643½), in Badcock’s Yard. Numbered 1643 on plate.


5. Henrietta “Atty” Owen as Little Red Riding-Hood, aged 4, [IN-1644], in Badcock’s Yard. This photograph is in the Catalogue Raisonnée, but neither the name of the sitter nor the associated image number was known until now. A print was sold in New York by a photographic dealer.

Dodgson’s diary reference for 2 July 1870: "During the week I photographed the Misses Harington, Owen “twins,” Mary and Beatrice Muller, etc.” However, this would make the twins aged only 4, and they are older in the photograph, which was probably done when they were aged 7 in May/June 1873. The location matches the floor and skirting board shown in similar photographs taken at this time.

6. Isobel and Margaret Owen, aged 7 (twins), taken in May/June 1873, [IN-2138], in Dodgson’s Christ Church Studio on the roof above Tom 7:6.

7. Edward Owen, aged 6, taken in June 1875, (IN-2329) (numbered on the plate), in Dodgson’s Christ Church Studio on the roof above Tom 7:6.

8. Edward Owen, aged 6, taken in June 1875, [IN-2330], wearing same striped socks and in same chair, in Dodgson’s Christ Church Studio on the roof above Tom 7:6 (heavily trimmed).

Photographs by Charles Dodgson (Lewis Carroll) in the Sidney Owen collection

1. Lucy Owen, aged 2 ½.

2. Lucy Owen, aged 6.
3. Lucy and Henrietta Owen, aged 6 and 4.


6. Isobel and Margaret Owen, aged 7.
Sidney Owen matriculated at Worcester College, Oxford, and became University reader in Indian history in 1878 and oriental studies examiner in 1887. He was appointed Student of Christ Church in 1883, but had known Dodgson for at least 20 years before this appointment. Mrs. Mary Ellen Owen was the eldest daughter of Henry Sewell, first premier of New Zealand, and a solicitor and statesman. She was a niece of James Edwards Sewell, Warden of New College, Oxford. The family lived at Malabar House, Bradmore Road, Oxford.

Edward Wakeling
Christ Church, 1981


The Making of a Renaissance Bestseller: Albrecht Dürer’s Treatise on Geometry

One of the rather unassuming display cases in the Upper Library had two very special volumes on view for the duration of the “Thinking 3D – The Mathematics of Space” exhibition open at Christ Church between 20 February and 10 May 2019. The case was dedicated to the geometry of perspective, and the volumes were two different editions¹ of Albrecht Dürer’s treatise on geometry, Underweysung der Messung (Four Books on Measurement).²

The 1532 version, issued in Paris by Christian Wechel, was the first Latin edition of the groundbreaking German original published in Nürnberg in 1525. The name of Wechel is not a household word among historians of culture, but, for a good number of years, members of the Wechel dynasty furthered the cause of humanism by publishing a great range of scholarly works. Christian Wechel (d.1554) originally from Herentals near Antwerp is the first in line of the family of printers, including Andreas Wechel (Christian’s son) and his sons-in-law Claude de Marne and Jean Aubri. He arrived in Paris about 1518. At the end of 1529 he bought the press of Simon du Bois and quickly he became a well-respected bookseller, publisher and printer, having founded an enterprise destined to be almost as


2 Albrecht Dürer, Underweysung der Messung [...] ([Nürnberg: Hieronymus Andraae], 1525).
famous as that of the Estiennes.³ He published text books, classical authors, scientific books in a variety of languages, among which French, Latin, Greek and Hebrew. He is known as one of the most important publishers of Erasmus’ works launching no less than thirty-one editions. He also made his mark by bringing to light new items by his contemporaries. Rabelais was one of them, and Dürer as well.

Looking at the long list of publications by Christian Wechel, Dürer's name appears with two titles: *Albertus Durerus [...] institutionum geometricarum libris [...]* (1532) and *De urbibus, arcibus castellisque [...]* (1535). The painter's presence among the authors Christian Wechel chose to publish is not that surprising. During his entire life the printer and bookseller kept close personal and commercial ties with the Low Countries and Germany. He is documented to have attended many of the Frankfurt fairs.⁴ All this may have alerted Wechel to Dürer's theoretical works. The important thing to note here is the fact that Wechel did not choose to re-publish the German originals. He opted instead for Joachim Camerarius' (1500-1574) masterful translations into Latin.

Camerarius was a well-respected humanist, with solid connections to Melanchton, Luther and Erasmus. He was, for a while, Rector of the Latin school in Nürnberg, so it is likely that he knew Dürer directly. A classical scholar, Camerarius translated and edited authors such as Homer, Sophocles, Cicero and Plautus. He also wrote poems, and works on grammar and style. Camerarius was a busy man. At the time when he was working on the translation of Dürer's theoretical treatises, he was in Tübingen, helping to re-organise the University there. Later he joined the University of Leipzig where he served as Dean of Arts and Rector. Despite his many interests and his hectic schedule, Camerarius devoted himself in no small measure to handling three difficult, cutting-edge scientific works by a painter thinking years ahead of his time. He rendered a complex, often inscrutable, German into clear, elegant, inventive Latin. When writing his works, Dürer was frequently in a position in which he had to come up with new German words and phrases, either because no exact equivalent existed or because his concepts were entirely novel. Given all this, Camerarius' translations were nothing short of tours de force. The translator had to have a grasp of a very demanding text, often having to interpret instead of translating, or having to devise methods that would make the meaning of a baffling original clear in Latin. In the end, Camerarius' efforts proved a great success. Dürer's works were rendered into the most elegant humanist Latin, thus adding the all-important gloss to the painter's already international reputation and popularity.

In the case of Dürer's treatise on geometry, *Underweysung der Messung*, Camerarius' translation was so highly regarded that, when a second edition was published in 1606, it retained the same Latin version that Wechel published in 1532.

The book issued at Arnhem in 1606 is an edition from the press of Johannes Jansonius the Elder (aka Johan Janesen / Jan Jansz d.1629). The printer and bookseller who undertook this publication is an interesting case of a savvy entrepreneur⁵. Before his arrival on the scene, Arnhem was a centre of little importance within the framework of the Low Countries book trade. The first printer to settle there from 1581 to 1585 was Willem Jansz van Campen. After van Campen's departure the town was left without any active press until 1597, the year Jansonius started to work there. He remained the only printer in town until his death in 1629. His ambition, skill, connections and flair for business allowed him to build a significant profile. He published at least 216 titles in Dutch, German, French and Latin, engaging with success in every part of the book trade, bringing out historical, theological, classical, geographical and mathematical texts. He printed the first Dutch newspaper outside Amsterdam. He owned a paper mill ensuring a steady supply of printing paper for his business.

Browsing through Jansonius' publications, it is easy to notice how profoundly entranced he was with Albrecht Dürer's theoretical work⁶. Thus, in 1604 he issued all three mathematical treatises by Dürer in one big volume, reproducing the first German editions.⁷ Separately, he published translations of *Vier Bücher von menschlicher Proportion (Four Books on Human Proportion)* in French (1613) and Dutch (1622). The print-runs for all must have been

⁶ Contemporaries of Erasmus: *A Biographical Register of the Renaissance and Reformation*, ed. by Peter G. Bietenholz (Toronto: University of Toronto Press, 2003), 434.
reasonably large, as there is no shortage of copies spread in major academic libraries all over the world.

If we focus on just Oxford University Libraries, and the Latin 1532 edition of Dürer’s treatise on geometry, Christ Church alone has two copies.8 Other copies in Oxford are in the Bodleian and the libraries of Balliol, Brasenose, Merton and St John’s colleges. As to the 1606 edition, Christ Church again has two copies.9 Apart from these, there are also single copies at Jesus and St John’s colleges.

Comparing the Wechel and Jansonius Latin editions, it is easy to see that the contents and illustrations remained largely identical. They landed on a particularly good translation, Camerarius,10 and they stuck to it. Interestingly, Wechel avoided the German editions altogether. Jansonius did publish Dürer's theoretical treatises in the original language as well, but the print-runs must have been small, as copies are few and hard to find. This obviously raises the question why was the vernacular so much less popular? Apart from the fact that Latin was then used as the “lingua franca”, the language of scholars in Europe, at the time when Dürer was writing, German had not yet reached what one might call a “literary” stage. Humanists did not have a problem with this. They wrote all their books, pamphlets and letters in Latin, a language supremely refined and flexible to do justice to poetic, philosophical and scientific thought. Dürer went against the trend, but his decision to issue his theoretical works in the vernacular gave him more fluency of expression and utmost control over the text. The difficulty in his enterprise, however, was that, like Luther, he had to create a German language of his own. So, what Dürer did was to take a more or less standardised chancery style as a basis and infused life into it, not by an attempt at humanistic oratory, but by tapping into sources able to yield masterpieces such as Master Eckhart’s Sermons, and, by listening to the man in the street. Despite Dürer being no linguist or scholar, for that matter, he made language speak to him. And in doing this, he made it pliable, bending it submissively to the complexity of his own cutting-edge thinking. In the end Dürer managed not only to describe complicated geometrical constructions both clearly and exhaustively, more so than any mathematician of his time, but also expressed historical facts and philosophical ideas in a prose style no less classic than Luther’s translation of the Bible.10

How did it all happen? We learn from Christoph Scheurl’s book Vite patris dominii Anthonii Kressen, published in 1515, that Dürer had by then completed a manuscript about art and painting. Sections of it were probably incorporated in Vier Bücher von menschlicher Proportion. We know from the artist himself that he had completed the latter by 1523, therefore before Underweysung der Messung, the first edition of which was issued in 1525. We know that Vier Bücher was finished first, because on the fair copy of the manuscript, now in Dresden, Dürer wrote: “1523, at Nürnberg. This is Albrecht Dürer’s first book, written by himself. This book I improved and arranged to have printed in 1528.”

Beyond the need to revise the material, one wonders what determined Dürer to postpone the publication of his treatise on human proportion. In the introductory study of his edition to Dürer’s Underweysung der Messung, Walter Strauss notes that the postponement happens to coincide with the artist's acquisition, in 1523, of the library of Bernhard Walther (1430-1504), a famous Nürnberg mathematician and astronomer. Perhaps it was this purchase that helped influence Dürer to put off the work on proportion until after the publication of his treatise on geometry.11 In fact, in the dedication, to his friend the German humanist Willibald Pirckheimer, of his Vier Bücher von menschlicher Proportion, Dürer makes a point of stressing that those who plan to study human proportion must first acquaint themselves with the information contained in his Underweysung der Messung.

Well-designed and deeply thought through, the treatise on geometry is witness to both Dürer’s multitude of scholarly sources12 and his own brilliance in interpreting them, while giving the whole a fresh twist. Besides Luca Pacioli (whom he may have met while in Italy) and Euclid (a copy of whose 1482 edition of Elementa we know the painter acquired in Venice),13 the influence of Alberti’s Della pittura is also easily traceable. A copy of this treatise had at one time belonged to the Nürnberg astronomer Regiomontanus and was acquired, together with his entire estate by the mathematician Bernhard Walther. As stated above, following the latter’s death, Dürer bought his house by Tiergärntertor near Nürnberg Castle, together with Walther’s extensive library which Willibald heimer catalogued in 1512.

8 These are bound together with Dürer’s De urbibus, arcibus [...] and shelved under the following Christ Church shelfmarks: AF.4.13 and, OQ.1.1
9 These are shelved under the following Christ Church shelfmarks: ZO.2.9 and OR.2.10.
13 The copy of the Elementa which is now in the library at Wolfenbüttel contains the following inscription: “This book I have bought at Venice for a ducat in the year 1507. Albrecht Dürer.”
As many of his manuscript notes make clear, Dürer intended *Underweysung der Messung* to provide the intellectual groundwork for *Vier Bücher von menschlicher Proportion*, his volume on the proportions of the body, where he specifies that without a solid understanding of lines, planes and bodies, proportion is bound to remain beyond the grasp of the student. This leads us to believe that, when he started writing his theoretical work, Dürer had a precise programme in mind.

Doubtlessly aware of all the source material mentioned above, and determined to contribute with everything he could to the liberalization of knowledge, in *Underweysung der Messung*, the first theoretical treatise he arranged to have published, Dürer made sure that he mastered a variety of techniques to create linear perspective and he discussed them at length. Following a broadly Euclidean progression, 'book' one of the volume deals with lines, especially plane curves and varieties of spirals. The second 'book' focuses on regular polygons, the third with properties of solid bodies, the design of astronomical instruments and the geometrical construction of letters. The final 'book' is concerned with polyhedra, culminating with a detailed analysis of perspective.

It is this last aspect of the German painter and polymath's work that the Ashmolean Museum, Christ Church, and Bodleian Libraries' "Thinking 3D" exhibitions aimed to highlight. In all three locations Dürer's treatise on geometry was on display and, rather tellingly, each time the curators chose one of the early versions of the Latin edition, not the German original. The reason for this is simple. There are very few surviving copies of the German. Both the 1525 and the 1538 editions are rare. Among Oxford libraries for instance, there is no first edition, and the only copy of the 1538 revised version of the treatise is kept in the Bodleian Library.\(^{14}\)

To start with, it was not an easy book to print, the 1538 revised edition in particular. Issued as a folio and printed in the characteristic German 'blackletter' Fraktur typeface ('Gothic' to most English-speakers), the volume contains a significant number of woodcuts (many more than the 1525 edition): 52 numbered woodcut diagrams to 'book' 1 (about lines), 36 numbered diagrams to 'book' 2 (about planes), 63 numbered diagrams (diagram 56 is a full-sheet fold-out woodcut, diagrams 59 and 61 with pasted-on extensions) to 'books' 3 and 4 (about solids), plus 23 woodcuts of letterforms and 8 full-page woodcuts of alphabets in 'book' 3, and, at the end of the fourth 'book', 4 large woodcuts of artists using a device for drawing in perspective (the last 2 are on a fold-out sheet).

A perfectionist to the core, Dürer chose Hieronymus Andreae (d.1556) for this complex and painstaking job. The latter was a well-respected woodblock cutter (‘formschneider’), printer, publisher, typographer and printer of music, based in Nürnberg, closely associated with the artist, whose best known achievements include the monumental, 192-block *Triumphal Arch* woodcut (first printed 1526), designed by Dürer for Emperor Maximilian I (1459–1519).

Comparing the 1525 and 1538 German editions of *Underweysung der Messung* printed by Hieronymus Andreae, the difference is striking, with the second edition being significantly expanded. When carefully examining the text and illustrations, it becomes clear that Dürer's revisions attest to the author's prolonged and passionate engagement with the complex mathematics the volume tackles. The second edition was published posthumously (ten years after the artist's death on 6 April 1528), at the request of Agnes, his widow. This was a relatively straightforward thing to do, as Dürer's thoughts pondering on how to improve and expand this first of his theoretical works were in plain sight, in a variety of manuscript notes and drawings, making it possible for scholars to reconstruct the evolution of the treatise.

The reconstruction was dramatically enhanced by the discovery, at the Bayerische Staatsbibliothek in Munich (under the call number "4° L.impr.c.n.mss. 119"), of Dürer's extraordinary personal copy of the 1525 edition of *Underweysung der Messung*.\(^{15}\) Fascinating to look at, the volume is a complete rendition of the author's edits and additions. It is literally laced with autograph remarks, either written directly in the margins, or bound together as separate pages, or contained on small scraps of paper glued onto the pages they reference.

When King Ludwig I of Bavaria bought the book in Rome in 1839, the authenticity of the item was highly controversial, but the watermarks on the paper refute any doubts.\(^{16}\) Moreover, the volume's documented

\(^{14}\) The second edition of *Vnderweysung der Messung, mit dem Zirkel vnd richtscheyt, in Linien Ebnen v̧n gantzen Corporen* (Nürnberg: Hieronymus Andreae, 1538) is kept in the Bodleian Library (Weston stack), under the shelfmark: Vet.D1 c24(1).

\(^{15}\) The copy has been newly scanned and can be found online in its entirety in the digital collections of the Bayerische Staatsbibliothek, http://daten.digitale-sammlungen.de/bsb000095496/image_1. For a detailed discussion on this item, see Noam Andrews, “Albrecht Dürer’s personal *Underweysung der Messung*”, *Word & Image*, Volume 32: Issue 4 (2016), pp 409-429. DOI: 10.1080/02666286.2016.1216821 (Accessed on 29 July 2020).

\(^{16}\) For a full description of the volume, please see the catalogue entry. https://opaclplus.bsb-muenchen.de/title/BV027388422 (Accessed on 29 July 2020).
history does not start from there. We can trace the provenance of this priceless copy of *Underweysung der Messung* much earlier than that. Various notes in the book give more details about its history of ownership. According to the inscription written by Anthonis van Linden on the flyleaf, Bartholomeus Spranger (1546-1611), Rudolf II’s court painter, once owned Dürer’s corrected copy. He is said to have purchased it in 1580, along with a number of wooden printed blocks. After Bartholomeus’ death, his Amsterdam-based nephew Gommer Spanger bought these precious items. The volume found itself on the market again, and was sold at the auction of Gomer’s estate in February 1638 to Abraham Alewyn (1607-1679), a wealthy Amsterdam collector and bookseller.\(^\text{17}\)

Provenance notes, including Dürer’s (on the top of the title page) in his personal copy of the 1525 edition of *Underweysung der Messung*.

It took ten years from Dürer’s death in 1528 to get the second edition out. Ten years, and the desire of the artist’s widow, Agnes, and his best friend, the humanist Willibald Pirckheimer, in collaboration with Hieronymus Andreae, the publisher, to fulfill Dürer’s vision.

Overall, the 1538 *Underweysung de Messung* is more than a simple revised edition. While errors in printing were not uncommon in Renaissance books, most of the modifications made by the author to this particular book reflect the painter’s growing insight into geometry, his refinement of language and his absolute need for graphic and typographic clarity. The innovative and relentless alternating of text and image made Dürer’s treatise on geometry a much more challenging book to print than other contemporary textbooks - such as Bartolomeo Zamberti’s 1505 translation into Latin of Euclid’s *Elementa*, the 1509 Latin version of Euclid’s treatise translated by Luca Pacioli, or, indeed, Pacioli’s own *De divina proportione*\(^\text{18}\) - where images are relegated to the margins or an appendix.

\(^\text{17}\) Albrecht Dürer, edited by Christof Metzger - exhibition catalogue from Graphische Sammlung Albertina (Vienna : Albertina ; Munich ; London : Prestel, [2019]), 56.

\(^\text{18}\) Euclidis megar[e]n[s]is philosophi platonici Mathematicarum disciplinarum Janitoris: Habent in hoc...
As it happens, Dürer had a long-standing interest in and direct access to these and many other books. Inventories of his own extensive library reveal a great number of volumes on geometry, arithmetic, the study of perspective and astronomy by Ptolemy, Sacrobosco, Ibn Al-haitan and Archimedes, as well as many contemporary works of relevance. It should not be surprising that Dürer felt the need to own and consult several editions of Euclid's work. Like the 1505 Zamberti translation, a copy of which Dürer had purchased in 1507, while in Venice, many have inscriptions and are also documented in the painter’s correspondence. Looking at all this, and casting a careful eye on the structure and layout of Underweysung der Messung, it is clear that the German artist not only maintained a lifelong fascination with Euclid and remained interested in the most up-to-date translations, but also used his theories creatively. The extent of Dürer’s knowledge of mathematics and the depth of his original thinking can be easily assessed in the case of a treatise such as Underweysung der Messung, as here we are in a fortunate position of having a wealth of documents to compare. By triangulating between all three versions of this work - the 1525 original, Dürer’s own heavily annotated copy, and the 1538 second edition—it is not only possible to follow errors (both typographical and mathematical) being identified and corrected, but also to scrutinise the author’s intimate engagement with mathematics, his passion for it, his endless attention to language, some of which tested the very limits of German, while exploring its capacity to convey meaning through description. Having the three versions of Underweysung der Messung at hand also allows the reader to confirm how closely Dürer’s edits and suggestions were posthumously followed by the printing house.

Let us therefore focus on the sketches in the manuscript notes glued by Dürer at the end of his personal copy of Underweysung der Messung. The first is the image of a man drawing a vase.

This is a very tentative drawing in which the artist holds a small device at the end of a long cord attached to the wall. In the text above, Dürer notes that the tip of the device should line up with the eyepiece and that there is a discrepancy that needs to be accounted for between the line traced by the cord and the imaginary line of sight. Compared with the detailed nature of the written paragraph accompanying it, the illustration is just a simple outline, something to remind the artist to further develop in preparation for the new print to be included in the revised edition of the treatise.

Manuscript notes and drawing added after page 89 of Dürer’s personal copy of the 1525 edition of Underweysung der Messung.
Having been seriously damaged by water in the latter days of the Second World War, the Dresden Sketchbook was for many decades beyond the reach of most scholars. Now the manuscript has been painstakingly restored and the original is available once more. Among the plates contained in this portfolio are drawings dwelling on the topic of perspective and studies in proportion which paved the way for both the treatise on geometry and the book on human proportions.

Towards the end of the manuscript, there are no fewer than three sketches representing versions of our man drawing a vase while using a perspective device (Taf.136 and Taf.137), and a large rendering of the device itself (Taf.135). The existence of these tentative sketches is not surprising. Düre did fully explore the enormous potential of the medium and expanded its functions far beyond anything ever attempted during the German Renaissance and we are immensely fortunate to have so many of his drawings preserved. Close to one thousand single sheets in collections throughout the world have so far been identified. The largest portfolio is housed in the Albertina in Vienna, followed by the Kupferstichkabinett at the Staatliche Museen in Berlin, and the British Museum in London. Even a superficial look into some of these collections reveals how comfortable Düre was using this medium, and how keen to exploit its versatility and immediacy. Unlike many of his contemporaries (who preferred one drawing type over others), Düre experimented with a wide palette of techniques: pen, brush, chalk, charcoal, silverpoint, watercolour and body colour. At ease with everything, he simply selected the drawing type most effective for a given task.

In the case of the preparatory sketches for the woodcut representing a man drawing a vase in the 1538 edition of Underweysung der Messung, both the one in Düre's annotated copy of the text, and the versions preserved in the Dresden Sketchbook, are just quick illustrations in ink. Nothing elaborate and far from precise, they nevertheless do something else rather exquisitely. They are the ideal means of expressing Düre's thoughts, catching his ideas at the speed that his mind was generating them. Looking at this particular series, although equally hurried, the Dresden sketches are somewhat more elaborate versions than the one in Düre's manuscript pages glued to his personal 1525 edition. All, however, have one important element in common: in just a few simple lines, they aim to illustrate the technique for representing three-dimensionality by focusing on the position of a man at work, using a complicated perspective device. There is a long way from these attempts to visualise
thought in motion to the woodcut as it appears in print. Yet, for a craftsman like Hieronymus Andreae they may have been enough. Especially as one of the drawings in the Dresden Sketchbook has all the key elements present in the woodcut: the fireplace behind the artist, the exact position of his hands using the device, the shape of the vase, even the precise shape of the hat he is wearing.

Woodcuts illustrating perspective devices added in the 1538 edition of *Underweysung der Messung*.

The second woodcut added to the 1538 edition is more intriguing. The printed version represents an artist drawing a naked figure lying on a table, using a pointer to aid the translation of the markings from a standing frame onto the grid in front of him. Interestingly, while all the basic elements have been preserved, the preliminary drawing is completely devoid of any element other than the device, the artist caught as he starts to draw, and the subject going to be drawn in perspective. Not only this, but the sketch is a mirror image of the print, with the artist placed on the left and a smaller grid at hand. The most noticeable difference however is the position and gender of the figure depicted. The male nude from the drawing has mysteriously been switched in the print. Here he is transformed into a larger-than-life female, resting somewhat unnaturally on two large pillows. It is impossible to state what prompted this dramatic transformation and whether Dürer was at all involved in it. As Noam Andrews notes, the gap between the Dürer drawing and the print requires further research, both to verify the authenticity of the woodcut as a bona fide end product developed directly from Dürer's own hand, or the extent to which the drawing may have been transformed in the hands of another artist, or the print shop of Hieronymus Andreae. All we know is that Hieronymus Andreae produced an impressive second edition of Dürer's *Underweysung der Messung*, embedding the artist's extensive corrections and revisions. His work however passed largely unnoticed. Despite Hieronymus' efforts, it was the Latin translation, by the humanist Joachim Camerarius, that brought Dürer's work to the attention of the whole of Europe. In fact, this work, in its Latin version, became one of the most popular specialist publications of its time. By all accounts, it was a true Renaissance bestseller. Its presence in so many libraries world-wide is proof of a much larger print-run. And, because the language of the translation was used throughout Europe, it was also more successful in drawing a larger pool of readers. Furthermore, after the publication of the Latin versions, this book and its sequel, *Vier Bücher von menschlicher Proportion*, were quickly translated into many other languages, thus making Dürer's direct influence not only as a great artist, but a significant mathematician, truly enormous, and heralding his treatises as inaugurating scientific writing as a genre.

*Cristina Neagu*

*Christ Church*

Dr Neagu is Keeper of Special Collections at Christ Church Library. She specialises in the literature and arts of the Renaissance. Her publications include *Servant of the Renaissance: The Poetry and Prose of Nicolaus Olahus* (Peter Lang, 2003) and ‘Dürer: Text and Image in Early Modern Broadsheets' in *The Perils of Print Culture: Theory and Practice in Book, Print and Publishing History* (Palgrave Macmillan, 2014).