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FROM RAGS TO RICHES: PURSUING THE CONNECTION BETWEEN ALBRECHT DURER'S LINEN PAPERS AND THE FUGGER FAMILY'S MERCANTILE TRADEMARK

Angela Campbell, C. Richard Johnson, Jr., William Sethares

There is a poem, quoted by Dard Hunter in his seminal text *Papermaking*¹ that is undoubtedly well-known to this readership:

*Rags Make Paper
Paper Makes Money
Money Makes Banks
Banks Make Loans
Loans Make Beggars
Beggars Make Rags*

Anon. English 19th C.

Neither Albrecht Dürer (Figure 1), the son of a successful goldsmith in the flourishing city of Nuremberg and one of the greatest graphic artists of all time, nor Jacob Fugger the Rich (Figure 2), the tenth of eleven children, born into a family of textile merchants from Augsburg and initially destined to become a cleric, who instead became the richest man who ever lived², were beggars, but both relied on and used a specific paper, made from those rags, pulled from matching moulds, in a way that not only enhanced their social and financial standings, but also enshrined their life works.

Albrecht Dürer was born in 1471 and died in 1528; his artistic genius was recognised at an inordinately young age and because of this, the vast majority of his drawings, prints, and paintings have comfortably endured over 500 years of admiration and display. Recently, one of these drawings, *The Virgin and Child with a Flower, seated on a grassy bench* (Figure 3), carefully mounted and safely preserved in a well-designed frame package, reappeared after having gone missing for several decades. It was not included in Walter Strauss's 1974 six-volume catalog of Dürer's drawings³, nor in the 1936-39 catalog by Friedrich Winkler⁴, but like 235 of the artist's drawings documented in the Strauss set, it was

drawn on a fine paper bearing an otherwise rare "trident" watermark. This squared trident, measuring 50 x 37 mm, with a small circle, or ball, to the immediate left (or right, depending on paper orientation) of the trident's shaft is the well-known trademark of the Fugger family of Augsburg, best illustrated in the Fugger *Ehrenbuch* (Figure 4)⁵.



Jacob Fugger the Rich was born in 1459 and died in 1525; like Dürer, Fugger's natural talents were identified early. Despite plans to pursue an ecclesiastic career, it became apparent quickly that Fugger "knew how to calculate his own economic and political world and build with them [the figures of his business accounts] as ingeniously as any real master among the great architects"⁶. Fugger's early wealth came from his family's textile business, which was

lucrative, but did not produce the staggering financial success that Fugger's later investments, in mines and metals, would yield. A man (and a family) keenly aware of the importance of marketing and an early adopter of "branding," it is not necessarily surprising that the Fugger family had its very own trademarked/watermarked paper. That the paper is of the finest quality is also unsurprising. What is unexpected, however, is that the Fugger family's watermarked paper is known to exist *only* in Albrecht Dürer's drawings. Incidentally, in 2008, a shipwreck was discovered on the Skeleton Coast of Namibia; in and around it were over 20 tons of copper ingots indisputably sourced from Fugger mines, easily confirmed by the very same trident mark, evident in Figure 5.⁷

In an effort to both confirm that this newly rediscovered drawing was in fact drawn by Albrecht Dürer and to better understand the connection between the two illustri-

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Figure 1: Albrecht Dürer (1471-1528), Self-Portrait. (Alte Pinakothek, Munich)

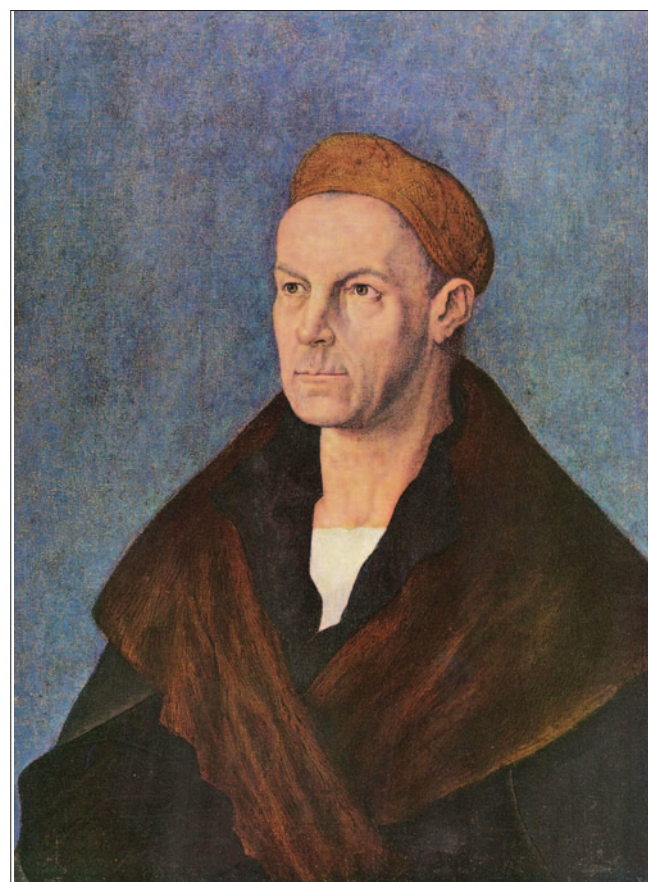


Figure 2: Albrecht Dürer (1471-1528), Portrait of Jacob Fugger, (Bayerische Staatsgemaldegalerie, Augsburg)



Figure 3: Albrecht Dürer (1471-1528) *The Virgin and Child with a Flower, seated on a grassy bench*. (Image captured by Angela Campbell, courtesy Agnew's, London)

ous men, the drawing medium and support were examined, documented in normal, raking, and transmitted light, as well as under magnification, images were captured of the watermark, which were then run through a sequence of analytical steps using software programs built specifically for this purpose, and a fibre sample was taken from the verso of the sheet and analyzed with polarized light microscopy. Jane McAusland, Art on Paper Conservator, carefully separated the drawing's primary support paper (with the trident) from several layers of heavier-weight backing paper (addressed in Peter Bower's article, pages 11-12), which allowed for this additional analysis. The following findings help to

both confirm the drawing's provenance and method of manufacture, as well as to build a framework that allows us to better understand the professional relationship between Dürer and Fugger.

The Paper

The primary support is a remarkably fine linen paper. It is thin, measuring $\sim 101.6 \mu\text{m}$ thick, strong and supple, light cream in color, and made from a mould with very fine laid and chain lines. It is much thinner and finer than the papers selected by Dürer for his most important engravings, and even more so than for his woodblock prints. It appears lightly sized, though much of the orig-



Figure 4: Fugger family tree with shields showing the trident and ball trademark, (p.24 of *Fugger Ehrenbuch*, Bayerische Staatsammlungen, Munich, inv. No. BSB CGM9460)



Figure 5: Copper ingot, bearing a trident watermark, found in a shipwreck.

inal sizing could have been diminished with use and handling. Under microscopic analysis at ~200x magnification, the exquisite long and fine linen fibres are clearly visible (Figure 6). While both the well-beaten linen and flax fibres (shorter, jagged edges), and the longer fibres are necessary to make the sheet, it is the microscopic intertwining and hydrogen bonding of these longer fibres that give the sheet its strength, despite its notable



Figure 6: Linen fibre sample, extracted from the verso of the *Virgin and Child with a Flower, seated on a grassy bench*, mounted in Meltmount and captured at ~400x magnification. (Agnew's, London)

thinness. The original deckle edges have been trimmed; the sheet now measures 162 x 164 mm. Apparent in transmitted light, the paper bears the trident watermark, located at the centre left of the sheet, the leftmost prong of the trident is immediately adjacent to a small (now repaired) loss in an otherwise bare area of the sheet.

In an effort to document the trident watermark and compare it to other tridents borne by catalogued Dürer drawings, several new software programs were employed. First, both a transmitted light image as well as a normal light image of the watermarked area of the sheet were captured with a standard DSLR camera. Historically, in order to capture an accurate and detailed image of a watermark, it was necessary to rely exclusively on Grenz or beta radiographs. The new “denoising” software developed at the Department of Electrical and Computer Engineering at the University of Wisconsin—Madison⁸ can analyse transmitted light images with print or drawing media included, visual evidence of which is then digitally removed in a separate step by using a supplementary normal light image of the artwork to cancel out those traces of media.

Once clear images of the watermark in *The Virgin and Child with a Flower, seated on a grassy bench* were captured, they could be compared to additional catalogued watermarks. For the purposes of this study, trident watermarks borne by seventeen drawings⁹ were compared using the following software: watermarkPointMarker; watermarkLibrarySearch; and visualizeOverlays¹⁰.

The seventeen images are transitioned from visual analysis to a computer-based software system that can search for matches. The primary issues in computationally comparing two watermark images are (i) the tilts of the two tridents, (ii) the locations of the tridents within their respective images, and (iii) the scale (in pixels) of the two trident images. These must be resolved in order to create a precise overlay, which is the recognized gold

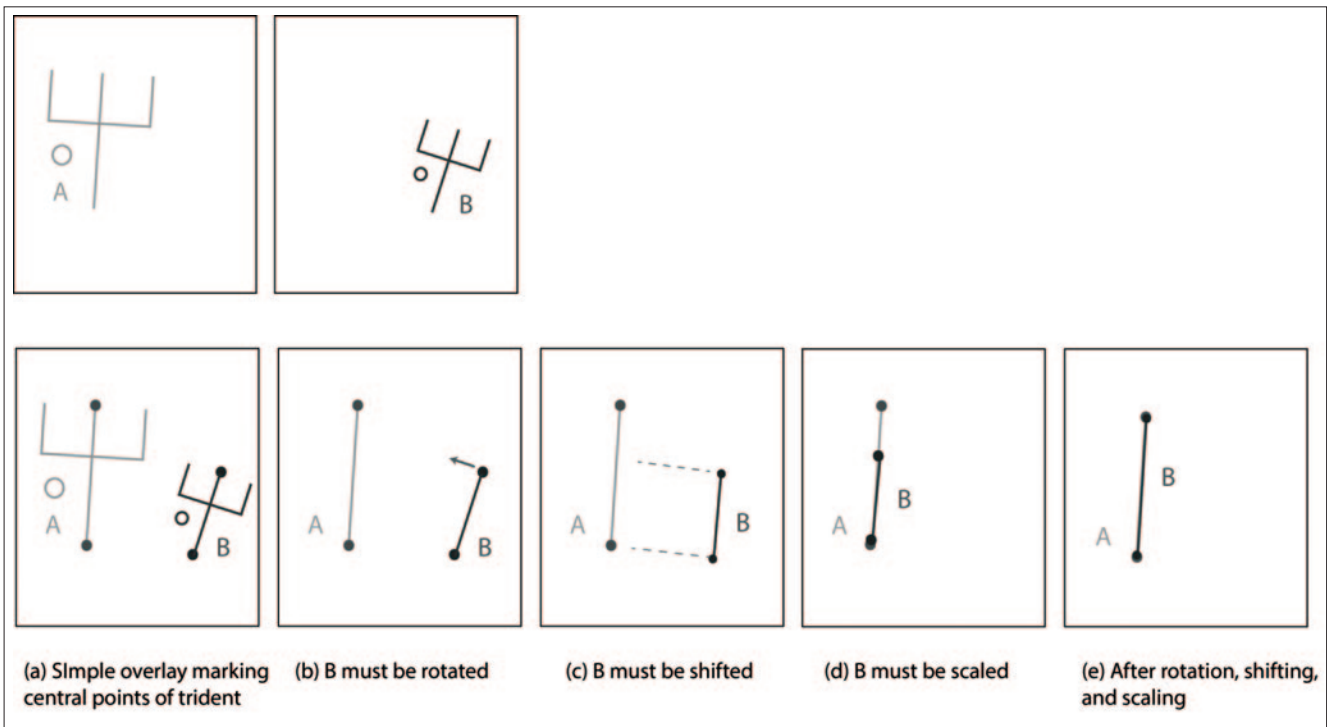


Figure 7: PointMapping1 is an illustrative aid to understanding the alignment process. Line drawings representing two separate trident images are simply laid on top of each other resulting in (a). The differing tilts, locations, and sizes are apparent.

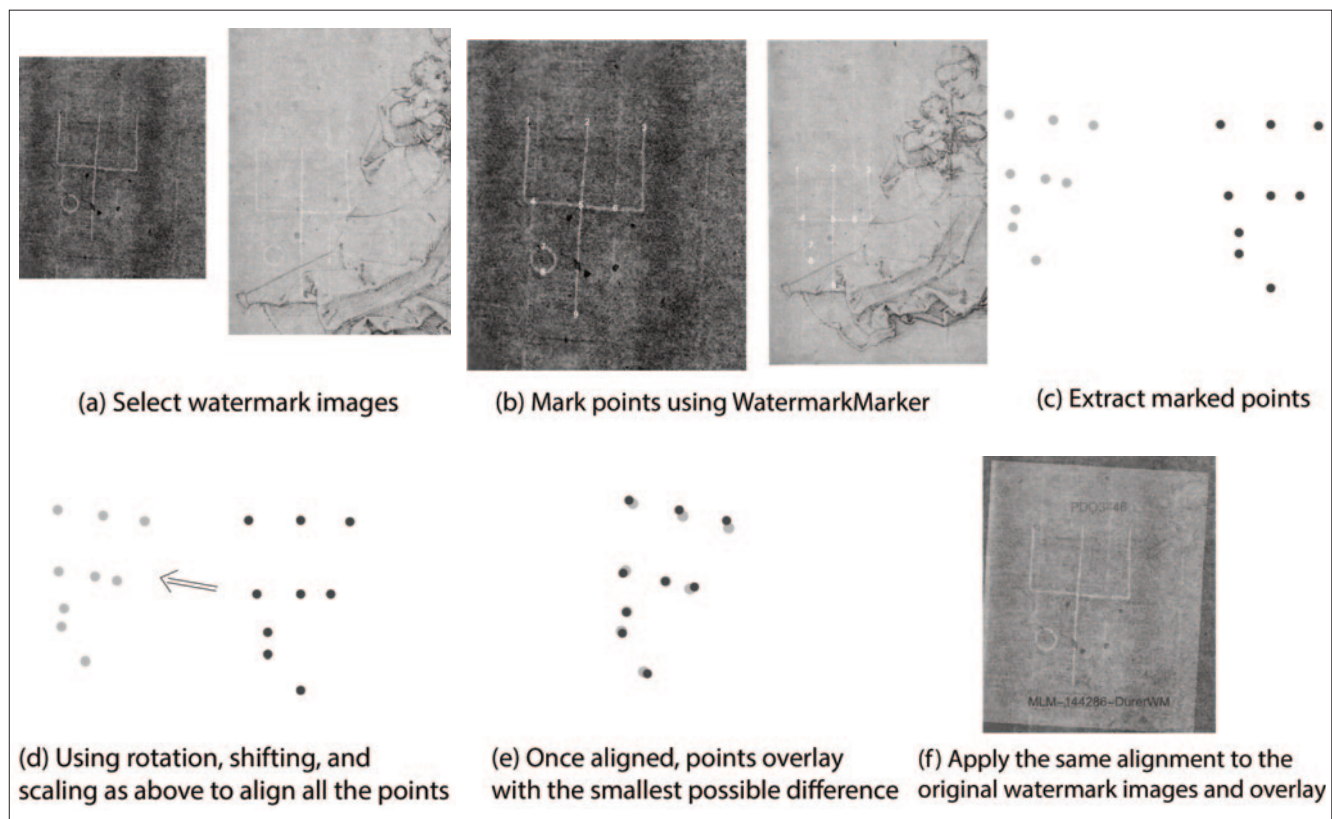


Figure 8: PointMapping2 shows how the alignment of the two clouds of nine points can be recast as a single computation that finds the amount of rotation, translation, and scaling needed to align the two point clouds so the sum of distances between the corresponding points is minimized.

standard of watermark comparison. The strategy used by Sethares, Ellis, and Johnson¹¹ is to convert the problem to a comparison of sets of key points in the two watermark images. Computation can then be used to

identify the rotation, translation, and scaling that maps the corresponding key points from one image to the other to achieve the best possible alignment.

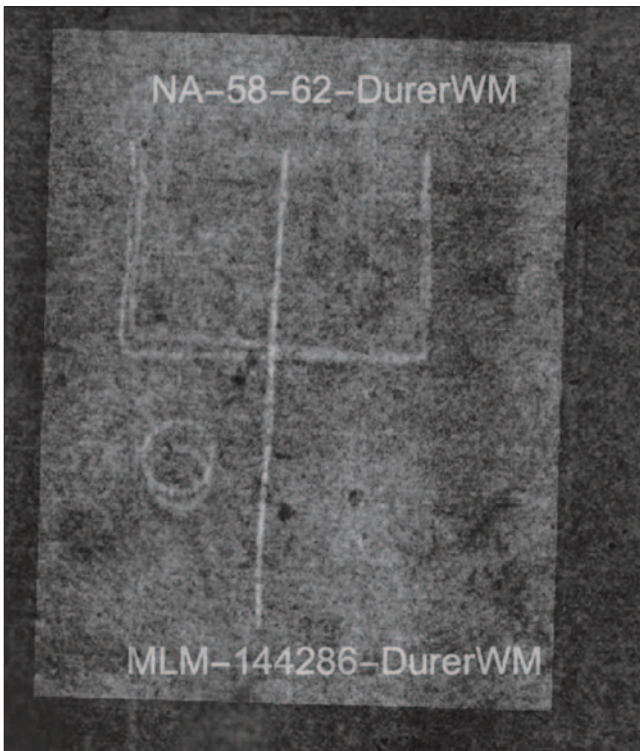


Figure 9: Shows overlays of the Morgan Library and Museum's *Constructed Head of a Man in Profile*, 1512-1513 (144286) and the Nelson Atkins's *Madonna and Child; Four Heads*, 1513/1515 (58-62). Observe that the left fork of the trident is significantly different, and the position of the circle has changed. These are not matches.

Figure 7 serves as an illustrative aid to understanding this alignment process. Line drawings representing two separate trident images are simply laid on top of each other resulting in (a). The differing tilts, locations, and sizes are apparent. For simplicity, this illustration focuses on aligning just the centre vertical elements of the two watermarks. The first step is marking the end points of this vertical element in each watermark. Part (b) illustrates that rotation of the upper point of the blue line can be achieved by rotating its top point counterclockwise. Now that they are parallel, the blue line can be moved to the left as indicated in (c) so its lower point moves to the location of the bottom point of the red line. The result in (d) indicates that the blue line needs to be scaled to increase its length so that the upper points of the two lines coincide.

This same kind of reasoning can extend the rotation, translation, and scaling to an entire set of key points. The first step of the process relies on human input to select several precisely locatable points such as the endpoints of the trident's prongs and the intersections of the chain lines and the horizontal bar in the tridents. Nine were selected, as shown in Figure 8(b), and marked (using watermarkPointMarker software) for all seventeen trident watermarks. The alignment of the two clouds of nine points can be recast as a single computation that finds the amount of rotation, translation, and scaling needed to align the two point clouds so the sum of distances between the corresponding points is minimized¹². This mapping is shown schematically in (d) and the resulting overlaid points are shown in (e).

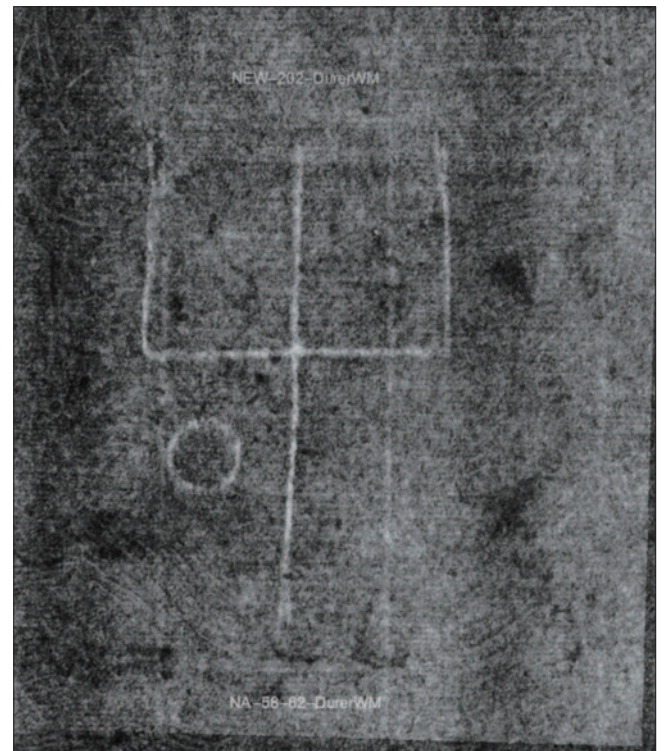


Figure 10: Shows overlays of the Nelson Atkins's *Madonna and Child; Four Heads*, 1513/1515 (58-62) and *The Virgin and Child with a Flower, seated on a grassy bench*. Here, all the main structural features align exactly.

Applying the same mapping to the watermark images allows them to be overlaid.

For example, Figure 9 shows overlays of the Morgan Library and Museum's *Constructed Head of a Man in Profile*, 1512-1513 (144286) and the Nelson Atkins's *Madonna and Child; Four Heads*, 1513/1515 (58-62). Observe that the left fork of the trident is significantly different, and the position of the circle has changed. These are not matches. Figure 10 shows overlays of the Nelson Atkins's *Madonna and Child; Four Heads*, 1513/1515 (58-62) and *The Virgin and Child with a Flower, seated on a grassy bench*. Here, all the main structural features align exactly. The only visible difference is in the very tip of the right-hand fork. Given its size and position, this difference is likely due to damage in the mould, perhaps during cleaning.

This computational method can also be used to give a quantitative assessment of the alignment error between any possible pairing in a library of marked watermarks. This technique is implemented in a program (watermarkLibrarySearch) that produces a bar graph of the alignment errors between a selected member of the library relative to all other members. In Figure 11, **Group A** the Nelson Atkins's *Madonna and Child; Four Heads*, 1513/1515 (58-62) watermark, listed as NA 58-62 DurerWM is compared against all seventeen marked tridents. Note that the bar associated with the Nelson Atkins's *Madonna and Child; Four Heads*, 1513/1515 (58-62) has length zero as this is a self-match and is therefore exact. The bars can be divided by length into two groups as illustrated with the blue line in Figure 11. The watermarks displaying the shorter bars are possible matches

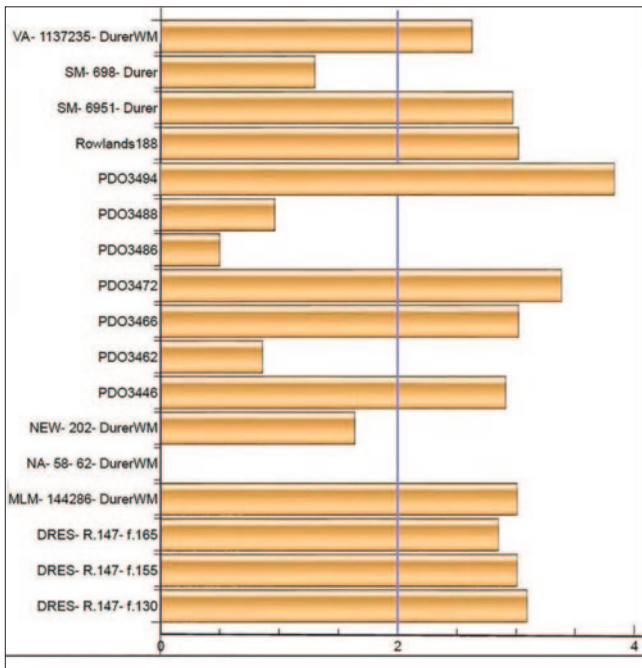


Figure 11: Bar graph of the alignment errors between a selected member of the library relative to all other members. The Nelson Atkins's *Madonna and Child; Four Heads, 1513/1515 (58-62)* watermark, listed as NA 58-62 DurerWM is compared against all seventeen marked tridents.

with the Nelson Atkins's *Madonna and Child; Four Heads, 1513/1515 (58-62)* each of which can be checked / confirmed (using visualizeOverlays). The nonzero error associated with pairs that match in the overlay are due to human imprecision in point marking. In fact, if two different markings of the same watermark are compared there will be a residual nonzero error. In Figure 12,

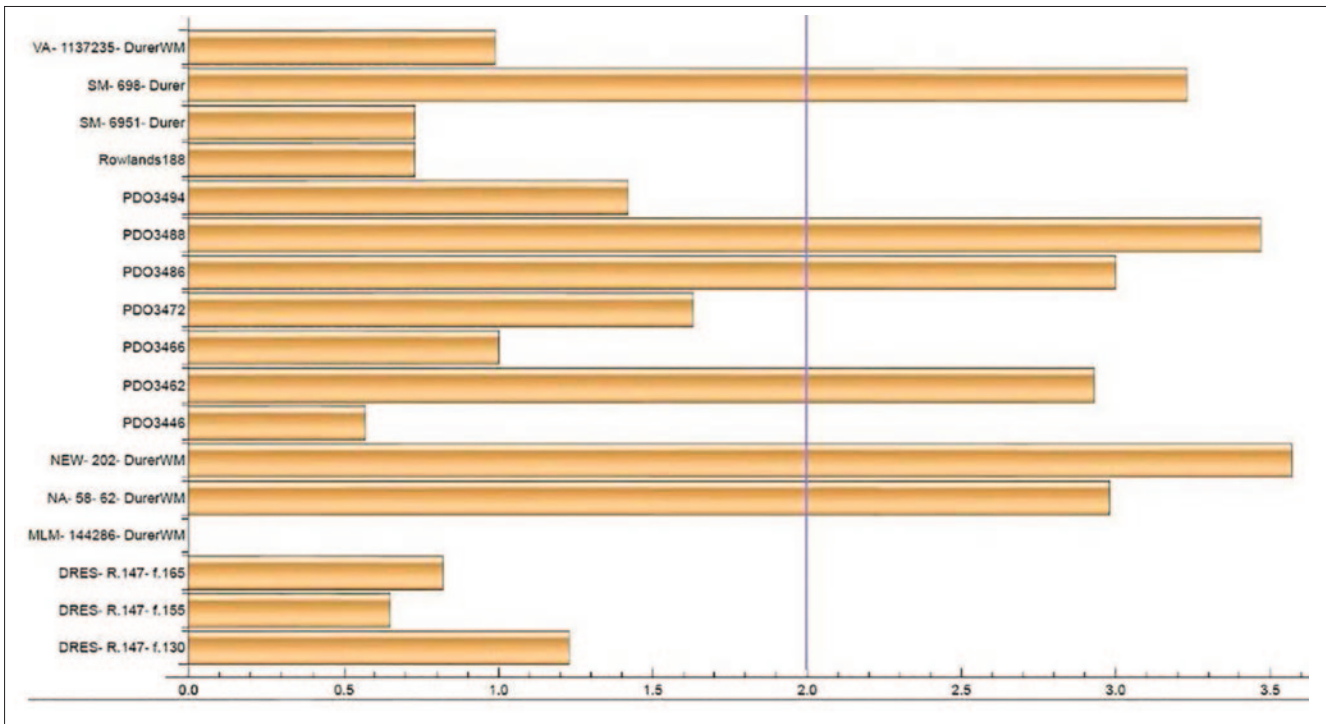


Figure 12: Bar graph evaluation of the alignment errors for the Morgan Library and Museum's *Constructed Head of a Man in Profile, 1512-1513 (144286)*.

Group B performs the same evaluation for the Morgan Library and Museum's *Constructed Head of a Man in Profile, 1512-1513 (144286)*. Again, the blue line indicates a separation of the set of seventeen watermarks candidates into two groups with the ones with smaller bars candidates for matching to be confirmed with an overlay. The separated groupings have the same members in **Group A** and **Group B**.

As demonstrated in Figures 8 and 9, the two groups are:

Group A (with the circle closer to the horizontal bar of the Trident)

Nelson Atkins: *Madonna and Child; Four Heads, 1513/1515 (58-62)*

Agnews: *The Virgin and Child with a Flower, seated on a grassy bench, n.d.*

British Museum: *Study of the Figure of Eve, 1506 (1846,0918.11/PDO 3462)*

British Museum: *St. Antony Abbot, 1514-1519 (SI,5218.206/PDO3486)*

British Museum: *Rhinoceros in profile to the left, 1515 (SI,5218.161/PDO3488)*

Staedel Museum: *Six Naked Figures, in the Middle a Man Tied to a Tree, 1515 (698)*

Group B (with the circle further from the horizontal bar of the Trident)

Dresden SLUB: *Anatomy of the Hand, 1517 (R-147, fol. 130v)*

Dresden SLUB: *Nude Woman, no Arms, Triangle on Chest, n.d. (R-147, fol. 155r)*

Dresden SLUB: *The Virgin on a Crescent, 1511 (R-147, 165r)*

Morgan Library and Museum: *Constructed Head of a Man in Profile, 1512-1513 (144286)*

British Museum: *The Virgin and Child seated on a bank, 1503 (1846,0918.8/PDO3446)*

British Museum: *Justice of Trajan*, 1500-1506 (1895,0915.963/PDO3466)
British Museum: *Christ on the Cross, and a portrait of a head in profile*, 1511 (SI,5218.116/PDO3472)
British Museum: *Two ornamental designs for the foot of a monstrance*, 1515 (SI,5218.142/PDO3494)
British Museum: *Studies of three caricature heads, drapery, and dog*, 1513 (1960,1008.2/Rowlands 188)
Staedel Museum: *Portrait Study of Matthaus Landauer*, 1511 (6951)
Victoria & Albert: *Madonna and Child with Cradle and a Bagpiper on Horseback*, 1512 (1137235)

The results from the watermarkLibrarySearch software indicate that it is highly likely that these two groups of papers were made from two distinct, possibly twin, moulds. The overlapping date ranges of both groups further support this evidence. While there is very little structural variation within these two watermark groups, particularly in **Group B**, images from **Group A** do show a slight shift in the upper prongs of the trident and at the bottom tip of the centre staff of the trident, most notably in *The Virgin and Child with a Flower, seated on a grassy bench* and in the Staedel Museum's *Six Naked Figures, in the Middle a Man Tied to a Tree*, 1515 (698). Though the clearest way to see the shift in watermark position is by using the visualizeOverlays software, differences between the watermark images of the

Nelson Atkins' *Madonna and Child; Four Heads*, 1513/1515 (58-62) and of *The Virgin and Child with a Flower, seated on a grassy bench* can be seen through visual comparison in Figure 10. Both watermarks are in **Group A**, with the ball closer to the horizontal bar, indicating that they likely were produced by the same mould. However, over time, as the moulds were used repeatedly, the vulnerable endpoints of the copper wire used for the watermark were bumped or shifted. Assuming that the original watermark did not exhibit deformations, the watermarks can be arranged chronologically by evidence of their appearance. In this case, watermark distortions identified in *The Virgin and Child with a Flower, seated on a grassy bench*, indicate that it was drawn on paper produced after 1506, since the British Museum's *Study of the Figure of Eve*, 1506 (1846,0918.11/PDO 3462) bears an unflawed watermark and is dated in Dürer's hand.

The watermark that bears the most similarity to the trident borne by *The Virgin and Child with a Flower, seated on a grassy bench*, is the one found in the Staedel Museum's *Six Naked Figures, in the Middle a Man Tied to a Tree* (698), dated 1515. Both watermarks exhibit slight indentations at the upper right prongs of the tridents and a slight leftward shift of the shaft. It should be noted here that the three very similar tridents documented in the Dresden sheets are all borne by distinct folios of the same sketchbook, the *Dresden Sketchbook*, in which Dürer's efforts to work out proportional studies of both human and animal figures were compiled for his own reference. The sketchbook also includes folios that bear other watermarks, as well as drawings not by Dürer's hand¹³. The dates of the various studies have been a source of scholarly debate for years, but it is accepted that many of them were drawn in the first two decades of the sixteenth century¹⁴. On the one hand, it is unsurprising that all three

of the folios fall into the same watermark group (**Group B**), since it is possible that they were pulled from the same mould sequentially, and unintentionally grouped, but it is surprising that *only Group B* tridents are evident, and no **Group A** tridents from the presumed twin mould are included in the sketchbook. There are two additional trident-marked papers in the sketchbook; unfortunately, images of high enough resolution could not be captured to include them in this study—it is unclear whether these additional tridents belong in **Group A** or **Group B**.

The resulting information from this analysis and the varying date ranges within the two watermark groups provides convincing evidence that the trident-marked papers found in Dürer's drawings were manufactured at or around the same time and the artist used the paper periodically over the course of approximately 20 years. The fact that the drawings associated with these papers are all similar in their execution, "finished" studies or at least "final draft" studies—further confirms that this was paper that Dürer, an artist always meticulous in his selection of materials, preferred for this particular type of work. Where the paper came from and why it bears the Fugger trademark, remains an intriguing question.

The Men

Both Nuremberg and Augsburg were flourishing centres of culture and craft in Early Modern Germany, and both were beholden to stringent trade regulations. That said, both Albrecht Dürer and Jacob Fugger had exceedingly high standards and the wealth and clout to ensure that a wide variety materials and services were available to them, regardless of restrictions. The most obvious example of overlap between the two men is in Dürer's portraits of Fugger, both on canvas and on paper, the earliest of which dates to c.1518, when the two men would have had the opportunity to meet at the Diet of Augsburg. While this does not explain Dürer's use of Fugger's papers as early as 1500, it does provide a literal illustration of the professional relationship between the two men at the apex of their careers (Figure 2). By 1518 Dürer had been in the service of Maximilian I for six years already, thanks to the Emperor's admiration of the artist's remarkable skill and the continued success of his *Triumphal Arch* (1515). Fugger, meanwhile, had been in full control of his increasingly prosperous company since 1510, after the deaths of his brothers and business associates Georg and Ulrich, and had been funding Maximilian's various plans and interests for years. In 1518, Maximilian I owed more than 175,000 florins to Fugger, which was a substantial fortune at the time¹⁵. Incidentally, it was around 1500 when the Fugger family began its ascension in earnest, approximately the same time as Dürer's earliest recorded drawing on the Fugger-marked paper.

Dürer's choice of papers for his various artworks deserve a study in their own right, but for the purposes of this research, there are two specific things to consider: his sources for papers, which extended beyond the borders of Germany, and his consistent paper preferences, evidenced in his comprehensive graphic oeuvre. Walter Strauss, in his catalog of Dürer's drawings, and Joseph Meder, in his catalogue¹⁶ of Dürer's prints, list hundreds of carefully traced watermarks associated with the

artist's works on paper. By cross-referencing these watermarks with Briquet¹⁷, Piccard¹⁸, and additional watermark resources, the vast expanse of territory from which Dürer obtained his paper is remarkable; the political boundaries have now shifted, but the area includes what is now Germany, Austria, France, and Italy. Evidence indicates that Dürer had access to an enormous variety of paper, and as his artistic success grew, his preferences were made apparent.

Take, for example, the papers Dürer selected for his three most important engravings, his *meisterstiche*: *Knight, Death, and the Devil* (1513), *Melencolia I* (1514), and *St. Jerome in His Study* (1514). Of the over 140 impressions examined for a study specific to these *meisterstiche*, only six were found to bear watermarks, and all were very late, possibly posthumous impressions¹⁹. The majority of Dürer's other impressions: woodblocks; etchings; and engravings, are printed on sheets that do bear watermarks—the only reasonable explanation for why his *meisterstiche* impressions do not, is that the artist intentionally purchased unwatermarked papers (which were presumably custom ordered) so that his masterpieces would be printed on the most pristine support available²⁰. To a casual observer, a watermark in an impression as complex as, for example, *Melencolia I*, is barely noticeable. To Dürer it was unacceptable. The evidence lies in his 1504 engraving of *Adam and Eve*, often mistakenly assumed to be part of the *meisterstiche* since the plate is similarly sized and the engraved lines are similarly complex. However, many of the *Adam and Eve* impressions bear a watermark, often faintly distinguishable in the unengraved areas and nude bodies and of Adam and Eve. Though none of the three *meisterstiche* engravings exhibit as much blank space, Dürer's intense attention to detail ensured that his master works would remain unmarred by even subtle changes in paper density caused by a watermark.

The Fugger papers, like the *meisterstiche* papers, were used preferentially, in this case for final-state drawings instead of for engravings, but the impetus was the same: they were the best papers available to realise the desired result. The Fugger papers are fine and thin, almost translucent (which explains why they were used in two-sided studies, where Dürer sketched an outline on one side of the sheet and refined it on the other, like the Morgan Library and Museum's *Constructed Head of a Man in Profile*, 1512-1513 (144286)), and sized just enough to prevent ink bleed, but not too much to impede ink absorption. It seems likely these qualities in a sheet of paper were as appealing to Fugger with what was likely a lot of contract-writing and document signing as they were to Dürer. Unfortunately, any evidence of Fugger contracts or documents has not survived, not even in the Fuggerarchiv, located in Dillingen, just outside of Augsburg; virtually all of Fugger's records were destroyed at the end of his life²¹. There is one elusive sheet of paper listed in Piccard-Online as bearing a "Fugger Watermark," in the Ulm Stadtarchiv, but the inventory number listed online is not compatible with the inventory lists at the Stadtarchiv and the document is thus inaccessible.

Despite what would seem a logical assumption that a textile family would own or operate a paper mill, making exhaustive use of the textile offcuts and rags, there is

no record of a Fugger-owned or -operated papermill during the 15th or early 16th centuries. One mill, on the outskirts of Augsburg, along the Singold River, a tributary of the River Lech, was owned by Philipp Eduard Fugger, the great-grandchild of Jacob's brother Georg, but it was sold to the city of Augsburg in 1597²² and there are no reliable records indicating it was a Fugger-run operation during Dürer's or Jacob Fugger's lifetime. Dr. Christof Metzger, Chief Curator of the Albertina, suggests that the trident paper is likely to have originated at the famous Augsburg paper mill of Hans Oesterreicher (c.1445 – around 1507). The owner was also a fabric merchant and thus belonged to the closest Augsburg circle of Jacob Fugger. From the 1530s onwards, the Fuggers, among many other businesses, also traded in paper produced by the Oesterreicher family, and it is reasonable to suggest that the trident paper was a customised product commissioned by the Fugger trading company.

Next Steps

In order to build a clearer understanding of the professional relationship between Albrecht Dürer and Jacob Fugger, it would help to document additional trident watermarks and further confirm that the sheets used by Dürer were produced on twin moulds at approximately the same time. Additionally, the sheet with the "Fugger watermark" in the Ulm Stadtarchiv may reveal useful information, if the discrepancy in catalogue numbers can be resolved. Visiting the Fuggerarchiv, in Dillingen, as well, would likely help in elucidating any connections the Fuggers had with local paper manufacturers. And though the paper will be challenging to identify, finding and analyzing other papers produced by the Oesterreicher family will help to confirm that the Trident paper was indeed made at their mill. Lastly, if anyone in this readership is aware of or stumbles upon a sheet of paper with a trident and a ball, please contact the authors.

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THE WATERMARK FOUND IN THE BACKING SHEET USED FOR ALBRECHT DÜRER (1471-1528) *THE VIRGIN AND CHILD WITH A FLOWER ON A GRASSY BENCH, c. 1503*

Peter Bower



Figure 1: The outermost backing sheet is watermarked with a fleur de lys in a double circle

This article discusses the watermark found in the backing sheet used for Albrecht Dürer (1471-1528) *The Virgin and Child with a Flower on a grassy Bench*, c. 1503, the lead article in this issue, and its relevance to part of the history of the provenance of the drawing itself. It is based on

images and information provided by Anthony Chrichton-Stuart of Agnews, London.

The drawing itself is in black ink on paper, measuring $6\frac{3}{8} \times 6\frac{7}{16}$ inches (162 x 164 mm), made from linen rag, probably with a small amount of fibre from hemp sail-cloth. This paper is watermarked with the Trident and ball symbol used by the merchant Fugger family as their trade mark.

The outermost backing sheet is watermarked with a fleur de lys in a double circle surmounted by a trefoil, with the letter M below. (Figure 1) The fleur de lys in a circle, in either a single or double circle, with or without letters and marks above and below the circle is one of the most common watermarks used in Italian and other Western European paper mills, but the use of a trefoil above a circled fleur de lys (whether a single or double circle) is relatively rare. Despite checking all available watermark catalogues and databases no match for the watermark was found. This is not that surprising as probably less than 20% of western European watermarks have been catalogued. What we have to go on are simply the researches of individual scholars recording what they examined.

However, one feature of this watermark is the Trefoil above the mark. Fleur de lys watermarks in single or double circles often come with devices above, but there are only two recorded examples of this feature anywhere. Figure 2 shows Briquet's illustrations of the two recorded examples of a circled fleur de lys with a trefoil above.¹

Both the watermark examples illustrated in Figure 2 come from the Treasury Records of the Duchy of Modena and Reggio, held in the Archive Communale of Reggio D'Emilia in use between 1590-1596.² The use of the

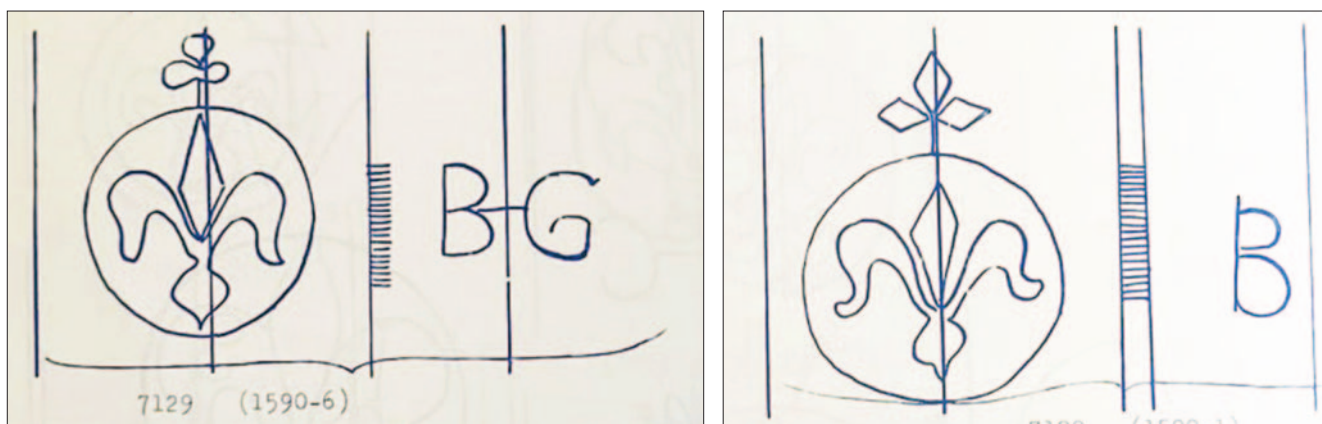


Figure 2: Briquet's illustrations of the two recorded examples of a circled fleur de lys with a trefoil above.

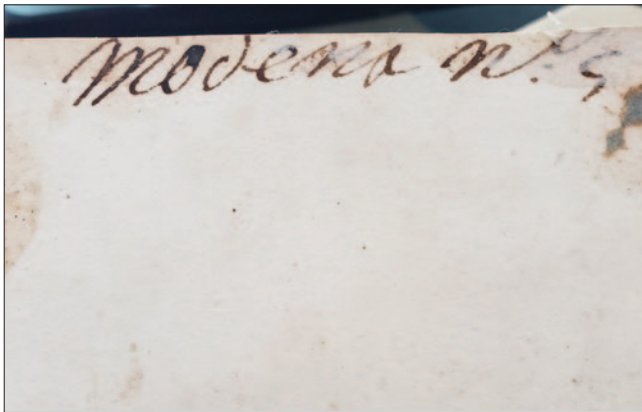


Figure 3: The 'Modena No 5' inscription on the innermost backing sheet.

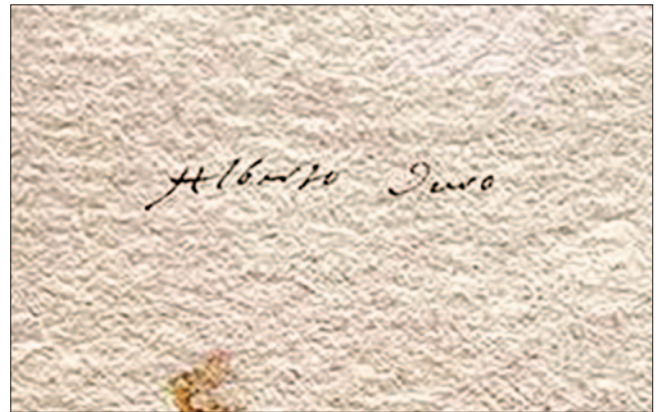


Figure 4: The 'Alberto Duro' inscription on the outer backing sheet.

trefoil in these two watermarks and in the watermark under discussion suggests that all three papers may well have come from the same papermill, distinguishing their products using a trefoil, rather than the more common star or crescent above the mark.

The primary support was, until recently conserved, supported by at least four different sheets of paper. The innermost support, on late 16th-century paper, is of the same dimensions as the primary support and has an inscription in brown ink of about the same date, 'Modena No. 5' (Figure 3). The outermost support is inscribed in an 18th-century hand 'Alberto Duro', the usual spelling in Italy at that time. (Figure 4)

Similar watermarks date from the 1560s to the 1590s and are mostly located in Ferrara and Modena, which was the sphere of influence of the d'Este family. These inscriptions suggest that the drawing was acquired by a collector in Italy, where Dürer prints and drawings were

popular from the artist's lifetime onwards. For example, the inventory of Cardinal Francesco Maria Del Monte, who died in Rome in 1626, lists 10 ebony frames with copper plates by Albrecht Dürer.³

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‘THIS MOST DISASTROUS AND DESTRUCTIVE BUSINESS’: THE FAILURE OF THE DARWEN PAPER MILLS, THE MOST EXTENSIVE PAPER MILLS IN GREAT BRITAIN AND THE LARGEST IN EUROPE

Mike Malley

Introduction

In May 1842 the weekly magazine, *Bradshaw's Journal*, published a reporter's view on a visit to C.H. and E. Hilton's, Darwen Paper Mills, known locally as Hiltons. It contained a great deal of detail of the process of paper-making and noted that they 'are considered the most extensive in Great Britain', and 'not surpassed in efficiency by any similar establishment in the United Kingdom'.¹ But unbeknown to the reader the mill was in deep financial trouble and its partners were weeks from bankruptcy. Two years later, the mills then identified as the largest in Europe, were up for sale and it is the events surrounding a double sale of the mills, family lies, deceit, embezzlement and multiple bankruptcies which shall now be discussed.

Darwen Paper Mills

Although paper making was well established in the surrounding area in the 1700s, Darwen Paper Mills was the first paper mill in Darwen; it was founded by bleacher Richard Hilton in the mid-1820s. Fifteen years later Bradshaw's described the Darwen Mills as covering a large space, with multiple buildings; it was sited alongside the River Darwen (Figure 1) and its paper manufacturing business was combined with fabric processing and coal mining. An appropriate starting place for this

article is an engraving of the mills (Figure 2) which was included with the Journal.

The engraving is looking over the site due east; its four chimneys billowing smoke, stand majestically over the huge site, and steam can be seen rising over some buildings. A coal mine, Mill Pit, can be seen on the far side, its pit head, winding gear and chimney are shown. Another coal pit was located one mile behind the artist and this is where the three coach, four wheel railway coal wagons would have originated. The coal was conveyed on rails down a driftway and under the turnpike road in the foreground. The rails ran down an incline, and the drivers at the rear would have used only rudimentary brakes to govern the speed. There is a rope between the rails and is seemingly pulling the two wagons on a flat section making their way to steam boilers and engines on the right, contained within the tall building with a church style window, with the attached chimney. The front coal waggon is passing over an arched bridge over the River Darwen, which is flowing from right to left. A third coal waggon is being pushed on a rail track in front of a mill reservoir and is heading towards the steam boiler and engine associated with the extreme left hand side chimney. The woman and child in the foreground are stood on the turnpike road between Blackburn and

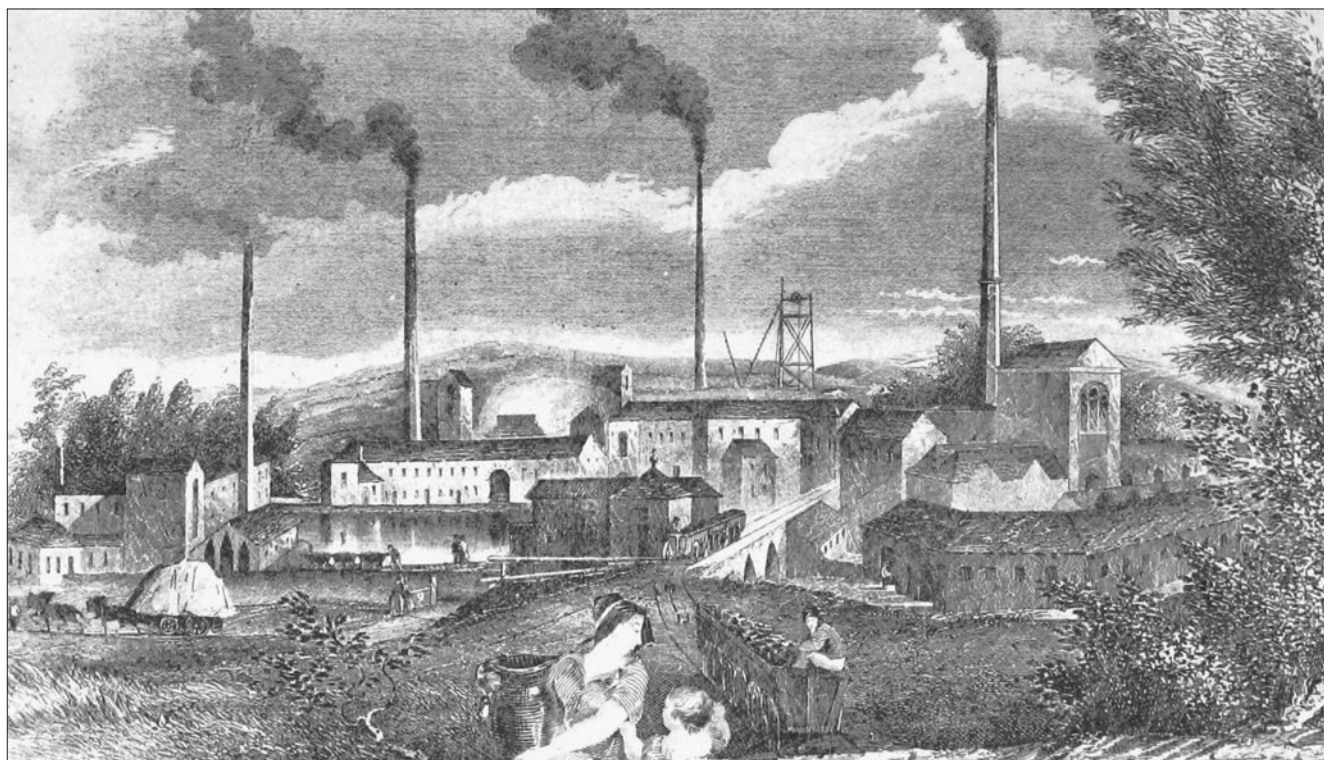


Figure 1: *Darwen Paper Mills*.

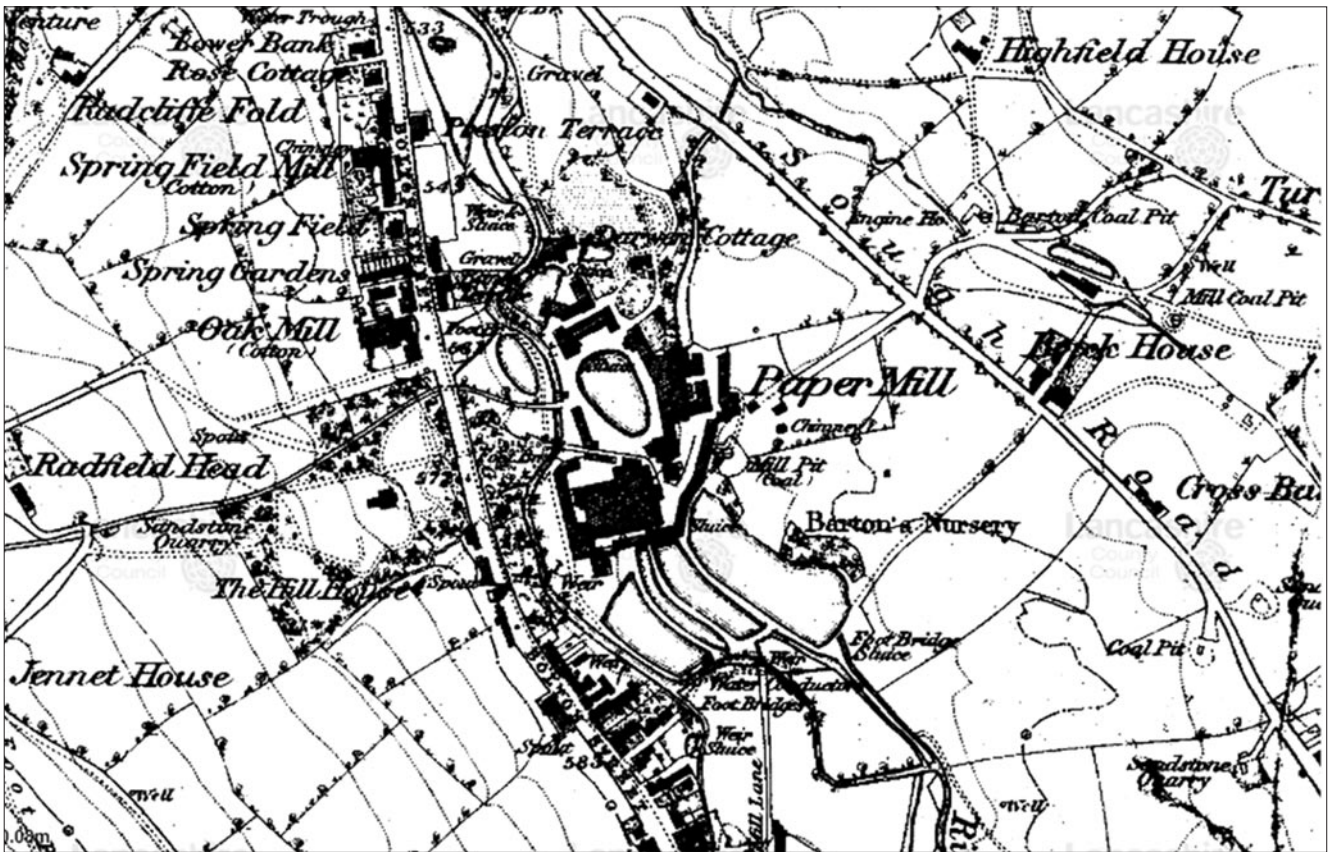


Figure 2: Ordnance Survey Map of Hiltons Paper Mill, mid 1840s.³

Bolton, which is where the two straining horses on a mill road, pulling a cart probably laden with paper, were heading.

Later evidence confirms that the premises were split into three distinct areas – two buildings were solely dedicated to paper making, the other combined calico bleaching, finishing, dyeing and glazing, with paper making. The latter would have been the oldest concern, probably containing the two 48 inch machines, and was likely the two storey building associated with the left hand side chimney. The buildings associated with the centre and right hand chimneys, having three stories, were bigger. As the right hand building was the largest it probably contained the three 60 inch and one 54 inch machines. In 1847 the other large building held two machines, but prior to 1843 also held four.

The journal also confirms the importance of coal. Hiltons owned several pits and were using upwards of eighty tons of coal per day for its 'furnaces' (steam boilers) at its paper mills. With each coal waggon holding about a ton, the eighty or so return journeys per day down a gradient of about one in ten for over a mile, would have been exhilarating. However, the life of the drivers was dangerous; for example, in August and September 1839 two died, one man fractured his skull by not ducking under a bridge (possibly the one shown in the engraving), the other had his legs trapped when two waggons travelling in different directions collided on the single line – both were judged to be accidental.²

The journal suggests that Hiltons employed around 450 hands, including colliery workers, of which 100 women

were employed in inspection and packing of paper, while a report relating to children in Industry, also published in 1842, included details about Hiltons workforce.⁴ Suggesting about 150 were employed in their mines, the latter identified 301 persons were employed at the paper mills and confirms that the workforce numbers could vary because the employees were 'hired by the day or by the week'. The mills never worked on Sunday's and 'even in the case of a break down, it is not allowed to be repaired on the day'. Three weeks prior to the visit by the inspectors the mills had been working both night and days, but latterly worked only a twelve hour day shift. The aim being 'reducing the stock of paper' and to 'reduce the price of the raw material; this it has done fully one-fourth; the raw material is the sweepings of the cotton-mills, which used to be thrown away for manure'.

	Adults	Children 12 and under	Young Persons 13 to 17
Male	173	9	22
Female	76	2	19

Table 1: The demographics of the mills workforce in 1842.

The site manufactured 'upwards of thirty tons of paper weekly', which could have equated to over 1,500 tons per annum. This can be compared with a report that in 1849 the output of the largest (unnamed) single site manufacturer was 'less than 1,600 tons per annum'; could this have been a reference to Hiltons from earlier times?⁵ Its equipment was said to be in an admirable state, the proprietors themselves had not only pioneered the use

of cotton wastes to make paper, but had made improvement in paper drying machines and upgraded the method of glazing the papers. It used cotton waste, rags (some were from Germany), strong linen sheeting and old ropes as raw materials, while its machines made paper up to the speed of 40 feet per min.

The one building that typifies the scale of the mill was the engine house shown below the left hand chimney. The Journal's reporter noted, 'the interior is elegantly fitted up, the ceiling is corniced and a light spiral staircase erected, that visitors may ascend and look down upon the ponderous machinery' and cannot fail to be impressed by 'such immense engines'. It was also said that the site had 300 Horse Power of motive power and that this 'engine room which supplies the motive power throughout the works'. However, not only would this have been insufficient to power the entire site, but just one set of boilers and steam engines and miles of drive-shafts, would be unreliable and unwieldy. Much more likely was that each of the three chimneys was associated with its own boilers and steam engines and each supplied power to one of the three distinct areas.

With up to ten paper making machines in operation and with the industrial powerhouse of Manchester on its doorstep and with excellent rail links, it's no surprise there was a wide range of papers made at Darwen Mills. The Journal notes that it made tissue papers, using only linen rags, and the Journal itself and the *Penny Magazine* was printed on Hilton newsprint paper, made from one third linen and two thirds cotton. Quality white papers seems to be a specialism; Figure 2 and other engravings in the Journal were printed on Hiltons white paper, made from 100% cotton and intriguingly the mills 'execute extensive Government orders'. In 1840 C.H. and E. Potters, the iconic wallpaper printers of Darwen, bought thirty two rolls of Long Elephant's (base paper for wallpaper printing) from Hiltons.⁶

Hiltons took three paper dealers as partners and their advertisement show they were retailing high-class white papers, especially to large stationers, publishers, printers, paper-stainers, and 'every Dealer and Consumer of Paper'; another noted that 'Newspaper Proprietors supplied on the most liberal terms'.⁷ The most comprehensive list of products supplied in 1842 comes from less happy times, more of which later. It advertised 20,000 reams ranging from writing papers, newsprint, elephant, tissue, blotting, many grocery papers, mill and glazed boards, paper hangings, coloured glazed cloth, marble, vellum, parchment, numerous types of business and music books and miscellaneous items such as playing cards, sealing wax and quills.⁸

Edward Hilton. A person of considerable competency and intelligence

Returning to the mill's ownership, it was said that Richard Hilton, who already operated a fabric dying works, founded the paper mills in the mid-1820s. However, as he withdrew from the business in 1827, his experience in papermaking was brief, leaving sons Christopher and Henry in charge. In 1830 their brother Edward, aged twenty-one, was taken into partnership. Christopher who had previously been declared bankrupt in 1821, died in October 1833 and following the father's

death in 1836, aged 70, Henry and Edward dissolved their partnership.⁹ Edward took all the paper mill buildings, stock-in-trade plus machinery and agreed to pay Henry £50,000 in equal yearly payments. Henry and Edward continued to run other businesses such as bleacher, finishers and coal merchants.

Central to what happened next relates to the marriages entered into by Edward Hilton, who In April 1835 married Louisa daughter of Thomas Cartwright; tragically Louisa died in 1838. Born around 1780, Thomas was a Merchant Draper and in 1813 was Mayor of Stockport. He became a banker, both trustee and auditor of the Stockport Savings Bank, and he and his sons James, Thomas and Charles all became involved in Edward Hilton's business. Following closely on the death of his first wife, in May 1839 Edward Hilton remarried: his second wife, Elizabeth Susan was eldest daughter of Sir John Key. The latter was even better connected than Cartwright, being Lord Mayor of London in 1830 and 1831 and Alderman and Sherriff of London. There was also a family connection to paper dealing through Johnathon Key and Sons, Wholesale Stationers of Abchurch Lane, London. Sir John Key also made substantial investments in Hiltons.

By 1839 the expansion of the Darwen Paper Mills was probably complete and a substantial increase in paper output would have had occurred, but the new equipment and buildings would have been costly, forcing the owner to borrow substantial amounts. Of Edward it was said that 'though he was young when he entered the partnership, it was evident that he was a person of considerable competency and intelligence'. On the 4th June, 1839, he formed a partnership with several paper dealers and around the same date entered into partnership with Nathaniel Walsh, for joint management at the Darwen paper Mills.^{10,11} The partners were:

1. C.H. and E. Hilton, Paper Makers at Lower Darwen. Edward Hilton and Nathaniel Walsh were partners.
2. Cartwright, Walsh & Co., Paper Dealers of Newmarket-buildings, Manchester. Nathaniel Walsh, Charles and James Cartwright were involved.
3. J. Imray, Cartwright, and Co., Paper Dealers in Upper Thames-street, and Old Fish-street-hill, London. Thomas Cartwright the younger was involved.
4. R.J. Hicks and Co., Paper Dealers at Wellington-quay, Dublin and Glasford Street, Glasgow. Charles Cartwright was involved. Richard J Hicks also ran a small paper mill, Loader's Park Mill, Harold's Cross, near Dublin.

Text from advertisements for Imray and Hicks is shown below:

To STATIONERS, PUBLISHERS, PRINTERS, PAPER-STAINERS, and every Dealer and Consumer of Paper.—J. IMRAY has the satisfaction of being enabled to announce, that having a Branch of the largest manufacturing establishment in the kingdom under his direction he is enabled to offer Paper upon terms of considerable advantage, especially deserving the attention of large dealers. Contracts made for supplies under specific dates for delivery. 207 Upper Thames-street, London.¹²

DUBLIN, DARWEN MILLS, Paper Warehouse,
RICHARD J HICKS

HAVING completed his alterations and extended his WAREHOUSE, from 14, Essex-Street, to 18, Wellington Quay, and, 14, Essex-Street, for Receiving and Sending out Goods. The very extensive Stock of Papers, of all kinds, now submitted to the trade, offers facilities not before to be met with, in this market. Newspaper Proprietors supplied on the most liberal terms, and Stock of Paper always held for their accommodation. Provincial Newspapers Stamped and forwarded to all parts Ireland free of extra charge.¹³

The decision to enter partnerships seems eminently sensible, because without a ready outlet for Hiltons paper there was no point in expanding. However, another reason was that his borrowings were becoming excessive and as the new partners paid an entry fee, it could be used to satisfy his bankers. With the expansion of the Darwen Paper Mills and putting in place paper dealerships in Manchester, London, Dublin and Glasgow, everything seemed set fair for the future, but it transpired that the newcomers had not been told the truth about the scale of borrowings, and bankruptcy beckoned them all.

The bankruptcy of C.H. and E. Hiltons and its partners

It was said of Hiltons that it was rapid expansion and the 'magnitude of the concern eventually involved the firm in difficulties that led to its suspension' and they had borrowed heavily from its bank, the Bank of Manchester. Primary records relating to this bank are held in Edinburgh, but due to the COVID-19 lockdown are not presently available.¹⁴ So this article will rely upon newspaper accounts to describe how the bank lent, took control and eventually bankrupted Hiltons, its partners, its own manager – and almost itself!

The author has previously written accounts where financial institutions were forced to take over the running of paper mills, and a newspaper account from April 1845 details the scale of borrowings and provides an idea of how Hiltons business was conducted when heavily in debt.¹⁵

Previous to the year 1839, the firm (Hiltons) had obtained very large advances from the Bank of Manchester, and at the time of the formation of the partnerships next mentioned owed the bank a sum of about £45,000. In 1839 two persons of the name Cartwright entered into the firm (Charles and Thomas Jnr), their father Mr. Thomas Cartwright, advancing a sum of £10,500 as their share of the capital. Very soon after, however, he was called upon for further advances, and he then gave acceptance for a further sum of £9,500, as a loan to the concern. Soon after this he was called on to attend a meeting at the bank, where he met Mr. Burdekin, the manager, and several of the members of Hilton's firm. This was about August 1840. At this interview Mr. Burdekin stated that further security must be given to the bank. Previous to that time a warrant of attorney (an acceptance by the partners of monies owed) had been executed by the firm to the bank for the sum of

£110,000 of which, however, the elder Mr. Cartwright was not aware. At that meeting arrangements were made for further security to the bank for the sum of £15,000. In November still further security was required, and on the 18th (November) a mortgage was executed of the property of the firm. Finally, in December, 1840, it was arranged that the works should be carried on under inspectors, in a way to secure the repayment of the advances made by the bank...

four inspectors were appointed—Mr. Cartwright, Sen.; Mr. Hilton, a relative of the principal partners (Henry Hilton), and who was under large advances the concern; Sir John Key, father-in-law to one of the Messrs. Hilton (Edward), and who also was under acceptances for the benefit of the firm to the amount of £20,000; and Mr. Burdekin, manager of the Bank of Manchester. It was provided by the deed that the business was carried on under the superintendence, and in all respects according to the directions of the inspectors, or the majority of them, provided Mr. Burdekin was one of that majority. In case he dissented the matter was to be referred to the directors of the bank, whose decision was final...

It was provided that the (paper) stock on hand should be converted into money ... after this arrangement had continued some time, in February, 1841, the younger Cartwrights (Charles and Thomas Jnr) became very much dissatisfied, and under further provision in the deed providing for change of partnership, it was finally arranged that they should retire from the firm ... The business was carried on for some time longer, but finally, in 1842, the bank withdrew their support, and Hilton and Welsh (the firm as it remained after the last change of partners) appeared in the (*London*) *Gazette*, paying but very small fraction, about 1s 6d in the pound, to their creditors.

In January 1841 with the Bank of Manchester effectively running the business and with financial storm clouds gathering, the partnerships of C.H. and E. Hilton, Darwen, Cartwright, Walsh and Co., Manchester and Imray, Cartwright and Co., London, were all dissolved. Later in November 1841 Hilton's partnership with R.J. Hicks and Co., Dublin was also dissolved. In all cases it was Edward Hilton and Nathaniel Walsh who were to be responsible for all outstanding debts.

It was noted above that the 'bank withdrew their support' sometime in 1842; presumably this was in January, when the stocks of the three paper dealers, 20,000 reams of all grades of paper and stationery, were up for auction following 'dissolution of the various partnerships'.¹⁶ In January 1842 bankruptcy proceeding commenced against Thomas Cartwright, followed by Edward Hilton and Nathaniel Walsh, then Henry Hilton, in July 1842. In July 1843 Thomas Cartwright's son, Charles, was prisoner at Lancaster Castle as an insolvent debtor, presumably incarcerated because he was trying to evade proceedings.¹⁷ Imray was also involved in bankruptcy proceeding in March 1843.¹⁸

It was stated that at the time of the formation of the part-

nerships in 1839 Hiltons owed the bank £45,000; this was revised upwards to £120,000 in 1842, but causing much consternation when the banks accounts were audited in 1843 they were said to be £160,000, roughly £16.5M in today's money.¹⁹ The bank was left with little option but to seek redress by selling the paper stocks, pursuing the partners through the bankruptcy courts and foreclosing its mortgages on the Darwen Paper Mills and offering the mills for sale.

It was noted that one third of the loans related to the Hiltons coal mining business, meaning that about £100,000 was spent on the paper mills. It's not known where the money had been spent, but a possible scenario was that the expansion in Edward Hilton's sole tenure was the building and equipment associated with construction of the large right hand side building that would have housed four paper machines. This would have contained the newest and largest paper making machines, that is three 60 inch and one 54 inch, together with their ancillary equipment, and would have been the major costs incurred in expansion. Elsewhere the author, as noted that in some circumstance the creditor, in this case the bank, would continue to operate the paper mill while waiting for a purchaser; in others it immediately cease production, but the equipment was insured and maintained in operating condition. In both cases this required ongoing investments and may go some way to explaining why Hilton's losses increased.

The Darwen Paper Mills sale details

The mills were advertised for sale a number of times in 1843 and 1844, one in September 1843 validates that with ten paper making machines, Hilton's was indeed extensive, noting:

... the Very Valuable Machinery, which of the best construction, and combines all the latest improvements for manufacturing every description of paper, the principal part of which comprises ten paper machines, for 48 to 60 inches paper, with the apparatus complete, in excellent working condition; forty-three rag-washing and beating engines; Hanson's patent drying, sizing, and parting machinery, complete, and entirely new; Fourdrinier's cutting machines; twenty-one willowing, dusting, damping, and stiffening machines; eight hydraulic presses, from 8 to 12 inch ram, four ditto with half-stuff chests; seventeen large bowking kiers; glazing callenders; nine lead bleaching stills; large stone and wood cisterns; dash wheels; lead pumps and piping; five 12 to 17 inch double-gear'd lathes; drilling machine, punching engine, smiths bellows and anvils; excellent fire-engine, by Tilley, London; with variety of other property, too extensive detail within the limits of advertisement.²⁰

It was another advertisement from May 1844 that identifies that the business was split into three portions, but could be 'divided at a trifling expense' into separate businesses and the vendor would accept a deferred payment for the machinery.²¹

In August 1844 another advertisement identifies the former Hilton works as the largest paper mill in Europe, noting:

IMPORTANT SALE OF PAPER-MAKING AND RAG-BLEACHING MACHINERY AT THE VERY EXTENSIVE PAPER MILLS, DARWEN, LAN-CASHIRE. MESSRS LOMAX & SONS

Are favoured with peremptory instructions from the Proprietors, to RE-SELL AUCTION, On the 14th, 15th, and 16th instant on the Premises, THE vast extent of very valuable MACHINERY comprised in the above Mills, (the largest in Europe) which is of the best construction, combining all the latest improvements for Rag-Bleaching and manufacturing every description of Papers.²²

Confirming these claims that Darwen Paper Mills were 'the most extensive in Great Britain' and 'Largest in Europe' is difficult to prove, but from the author's limited experience of the 1830s, mills operating one or two paper making machines were the norm. It is true that paper machine manufacturing in the United Kingdom was ahead of Europe and the 1830s was a period of rapid expansion in machine made paper; for example, in the United Kingdom fewer than 100 machines were operational at the start of the decade, but probably double that number ten years later, nevertheless a mill operating eight or ten machines seems exceptional.

An indication of the production capability of a paper mill can be gained by knowing the numbers of beating engines used to shred rags used to process paper pulp. In 1852 a survey of paper mills in the United Kingdom records the highest numbers of engines as being thirty six at Bridge Hall, Bury, next was thirty four at Halshaw Moor, Farnworth, twenty two at Hollins, Darwen and twenty one at Penicuik, Cowan's mill midway between Edinburgh and Peebles. Hiltons with its forty three washing and beating engines ten years ten earlier can therefore be seen to be exceptional, but size was not a precursor for success as the next owner's demise was exceptionally swift.

The second coming of Darwen Paper Mills

The purchaser in late 1844 was Charles Edmondstone; it was as a result of his marriage to Alice, daughter of Thomas Ainsworth, of Preston, in July 1838, that introduced him to paper making. Edmondstone and David Ainsworth, presumably his brother-in-law, were partners as Fustian Manufacturers and Warehousemen in Manchester, but clearing his way to take over at Darwen Paper Mills, that partnership was dissolved in June 1844.²³

Charles's foray into paper making was undoubtedly connected to the fact that his brother-in-law was Edward Hilton's elder brother, Henry, who in September 1837 had married Ainsworth's eldest daughter, Mary Lawrie. With Edmondstone having no background in paper making it would have been Henry who would have taken a leading role in resurrecting the papermaking business. Yet this was to be a short journey, because by December 1846 and less than thirty month in charge Charles Edmondstone, Paper Manufacturer, Bleacher, Finisher, Coal Dealer, Dealer and Chapman, was bankrupt and shortly afterwards the mill was once again up for sale.

It is not known who his principle creditor was, but at the

time of his bankruptcy he owed almost £6,000 to the Preston Banking Company and a complicated legal action took place regarding the sequestration of his Cardross Park estate in Scotland, because of his brother Robert John's debts following his bankruptcy in May 1848. This may well have been an attempt to protect family assets from the receiver, but eventually in 1855 his bankruptcy was settled. There is little evidence to identify the cause of Edmondstone's failure, so other than suggesting lack of experience, his inability to pay deferred payment for the machinery and the need for deep pockets, that story will remain untold.

The mills were once again offered for sale in May 1847, the advertisement being very detailed (see Appendix 1). It confirms a total of forty three beating engines, eight paper machines, three 60 inch, one 54 inch, one 50 inch and three 48 inch, but intriguingly two paper machine have been 'lost' since the 1843 advertisement. One possible explanation is that they were purchased by the world's first wallpaper printer by machine, C.H. & E. Potter. In which case they would have been sited at Knott or Belgrave Mill, both in Darwen, and would have been run by former Hilton's papermaker John Carlisle; it would also account for one of the three storey buildings having only two machines.

Showing that the high quality papers continued to be produced at Darwen Mills, Edmondstone's bankruptcy stock included 3,500 reams of Printing, 2,000 reams of Post, 1,000 reams of Foolscap and Tissue Papers.²⁴ The mills were not immediately sold and another advertisement was published in July 1848, but it was not until the following year that the mills were purchased by Eccles Shorrock. The mills were split into three sections,

becoming carpet weaving and cotton spinning mills.²⁵ For the third section Shorrock partnered James Dimmock to found the Darwen Paper Mill; after 1867, it was run by Dimmock alone.²⁶ It was established on the site of Hilton's most westerly factory unit, that is the second chimney from the left in Figure 2. That the entrance retained the wording DARWEN PAPER MILLS confirms Eccles and Dimmock chose to retain both the original Hiltons mills name and its 1830s façade (Figure 3). Grace's Guide mistakenly identifies it as being the Darwen Paper Mill Co. of Spring Vale

Thomas Cartwright, ruined by his connexion with the Hiltons

At this stage it might be thought that the story of Hiltons Darwen Paper Mills had been told, but this would not only ignore the real reasons for the mill's demise, the dire effects on Thomas Cartwright and his sons, but also the fatal repercussions at the Bank of Manchester.

We cannot know the grief that Thomas Cartwright suffered on losing his daughter, nor how good his relationship was with his former son-in-law, but it might be expected in times of financial difficulty that it was natural he was the first person Edward turned to, but what was not expected was his son-in-law's lies and deceit.

In August 1843 the circumstances of Thomas Cartwright's bankruptcy was laid bare, when a newspaper reported that in June 1842 the Bank of Manchester had 'issued a writ against him for certain bills, to the amount of £9,500, which he had accepted, and of £18,000 which he had endorsed, on behalf of two of his sons, who were connected with the extensive paper works of Messrs. Henry and Edward Hilton, and who had



Figure 3: *Darwen Paper Mills entrance, circa 1940.*²⁷

become bankrupts'.²⁸ When the order was served on Cartwright, he berated 'he could not pay as many shillings; that he was a ruined man; that he had been ruined by his connexion with the Hiltons'. He also identified the improper behaviour of the Bank of Manchester, because before investing he had exercised due diligence and had spoken to its manager, Mr. Burdekin. He had been informed that Hiltons were 'in good credit, and had a large balance in the hands of the bank', but in actuality 'at the very time, they were largely indebted to the bank'. With no knowledge of the true situation he invested in Hiltons, but inexplicably only after the deed of partnership had been completed did the bank tell him that it was grossly overdrawn. In the bankruptcy proceeding he stated the blindingly obvious, 'had he known that the Hiltons were in difficulties he would have shuddered at the idea of allowing his sons to enter into partnership with them'.

In these circumstances Burdekin can be seen as a liar, but by not divulging to his former father-in-law the dire straits of his finances, Edward Hilton was equally culpable. As a result the duped Cartwright lost investments, his mansion house, its sumptuous furnishing and his reputation. The advertisement for the property auction in March 1843 was addressed to the 'Nobility and Gentry to sell the Gentleman's Residence and extensive belongings at Highfield House, Heaton Norris, near Stockport belonging to Thomas Cartwright, a bankrupt'.²⁹ Edward's second father-in-law, Sir John Key, was also involved at Hiltons to the tune of £20,000, but with large reserves he escaped bankruptcy. Thomas Cartwright jnr. was a partner at J. Imray, Cartwright, and Co., and it was James Imray, who also found himself in the Court of Bankruptcy in March 1843 facing the Bank of Manchester, for 'advances made to that concern', the claim was for the huge sum of £65,000.³⁰ Christopher Cartwright was involved with R.J. Hicks and in 1846 it was Hicks who was involved in bankruptcy proceedings in Scotland.³¹

The questionable behaviour of Edward Hilton was also reported in 1843, which identifies that he and his brother Henry, were both deceitful when they failed to satisfy the bankruptcy accountants who had tried to piece together their separate and combined business accounts. The brothers also had an extensive colliery business and it owed 'a sum equal to one third of the capital in the paper concern'.³² It was said Edward had been 'examined at intervals from January... sometimes for four or five hours a day... (but) could not elicit from him a satisfactory statement of the accounts'. The accountants reported that both men chose not to answer questions and blatantly and repeatedly falsified records and Edward and his second wife Elizabeth, were also said to have 'withdrawn over £15,000 from the company fraudulently'.³³ As late as October 1853 the bankruptcy commissioners were still auditing Edward's accounts to find funds desperately required by the Bank of Manchester and it is this story which identifies the true reasons for the failure of Darwen Paper Mills.³⁴

Enormous advances made to Messrs. Hilton of Darwen; the role played by the Bank of Manchester

The Bank of Manchester was established in 1828; it was the first bank to enrol under limited liability legislation,

by which the shareholders' losses was confined to their share investment. With 600 shareholders and 700 accounts, it was a relatively small institution, with limited reserves. It was led by its directors who passed on the day to day responsibility to its managing committee, but with seemingly little financial experience, they passed on a great deal of responsibility to the bank's manager, Edmund Burdekin.

Alarm bells on the financial health of the bank began as early as October 1839, when the Directors stated that they 'deemed desirable to call the attention of the Proprietors (the shareholders) to some circumstances deeply affecting their Interests, not only as stockholders, but merchants, manufacturer and traders. Within the past three years there had been three distinct periods in which the industry of the country had been paralysed by sudden and violent changes in the value of property'.³⁵ From this it can be assumed that the value of property the bank held as surety against loans was much reduced. Elsewhere the author described similar circumstances in the 1870s, when financial organisations were competing to lend money and it was common for paper mills to be overvalued when granting mortgages, only to find out it was valued too highly when forced by debt to sell.³⁶

The background of joint-stock banks, how they operated and their apparent 'rocky' relationship with the Bank of England is also laid bare in press reports, a full evaluation of which would require many more pages. However, Burdekin took his opinions of ill-feeling to the central government, but the impression is that Threadneedle Street perceived the 'new upstarts' as second-class and purposely made their functioning difficult.

Besides trading from Market Street, Manchester, the Bank of Manchester had branches in Stockport, Bolton and in Newtown, Mid-Wales. An extant banknote mentions the Newton branch, but has annotations of proposed changes, including the addition of the bank's paid up capital of £0.4M. The cartouche's includes a reference to the printer of the note, namely Perkins and Bacon, London, the wording, *Patented Hardened Steel*, relates to the printer's steel hardened plates which could print large numbers of identical banknotes.³⁷

That the situation had deteriorated at the Bank of Manchester can be seen two years later in October 1841, when the press were denied entry to its Annual General Meeting (AGM). Provoked by rumours of financial scandals and a collapse of its share price, several of the principal shareholders 'waited upon the board of directors to urge upon them, in the strongest, but at the same time the most respectful manner, the propriety of concurring in the appointment of auditors to examine into the affairs of the bank', but the proposition was objected to by the directors.³⁸ In the meeting the Chairman only offered partial comfort, suggesting 'in many respects, (the AGM was) of an unfavourable nature, and did not show the affairs of the bank to be that flourishing condition which they could desire, it was by no means so bad as had been represented in some quarters'. By this stage the bank needed to act, which accounts for both the timing of its withdrawing the funding to Hiltons and its partners in late 1841 and the dash to sell the stocks of the three paper dealers to gen-

erate funds in January 1842. In the 1842 AGM, the now audited results were decidedly unfavourable, a list of debtors named seventeen businesses who owed a total of £700,000 and thirteen others who in total owed £100,000, plus other bad debts known only 'to the managers, and perhaps a few other directors'.³⁹

This list shows that Hilton's debt was the second largest at £120,000; presumably it had increased from £45,000 as the inspectors and bank officials examined Burdekin's financial papers. At one stage Burdekin was accused, but never convicted, of embezzling £30,000, which was 'concealed through the ingenuity of the individual', but in this scale of losses at the bank it was a trifling amount.⁴⁰ Although initially he was blamed for the demise, later shareholders more accurately accused the management committee for 'squandering the money of the bank in conducting print-works, mines, paper mills'.⁴¹ Although they specifically mentioned the 'enormous advances made to Messrs. Hilton of Darwen, papermakers', the main talking point at the meeting was that in the previous week Burdekin had absconded to America, some suggesting his suitcase contained funds of the bank. Conversely it was noted that directors encouraged him to flee, although one director said his suggestion was for Burdekin only to visit Glasgow or Buxton to recuperate from stress. An equal pertinent reason for him to flee was reported in the very same edition as the previous comments, because Burdekin, banker, dealer and chapman was declared bankrupt.⁴² That he was allowed to run other businesses while employed as bank manager raises the addition spectre of conflict of interests and provides yet more ammunition against him.

It was also noted that Burdekin was unlikely to be returned by authorities from the USA, without which it would be impossible to discover the 'full extent of these fraudulent transactions'. This may have pleased a number of directors, because his evidence might well have implicated them, in which case Burdekin was a very convenient scapegoat and they were very keen to avoid publicising their shortcomings. By 1844 the shareholders and directors of the Bank of Manchester were reported of becoming weary of the process of realising assets to repay its investors, taking until 1852 for the shareholders to be paid off, achieving the aim of bringing 'this most disastrous and destructive business to so favourable a conclusion'.⁴³

Conclusion

There is evidence to support a view that Darwen Paper Mills were the most extensive in Great Britain around 1840 and it is also likely at the time they were the largest in Europe. The major expansion occurred between 1836 and 1839, when Edward Hilton was in sole charge, but when his business began to flounder and probably as a result of the Bank of Manchester manager Edmund Burdekin's advice, Hilton took partners into his business. Taking paper dealers as partners had the double benefit of providing a ready outlet for his expanded production and the money they advanced as their share of the capital could pay back some borrowings. But again suggesting underhand dealings by Edward Hilton and Edmund Burdekin, almost as soon as the partners were in place the dire straits of the business became known and they chose to end their relationship.

Due to profligate and reckless advances, coupled with falling property values, by 1839 the mortgages held by the Bank of Manchester on the Darwen Paper Mills would have been insufficient to cover loans, so to avoid immediate bankruptcy the bank took control. In the face of mounting losses in this and numerous other businesses, the directors of the bank eventually woke up to the huge deficit sustained by its management committees excessive lending. Burdekin, who evidence suggests was Edward Hilton's confidant and mentor, was blamed, yet if his words are to be believed, he thought Hiltons could have prospered, because he had assured a colleague, 'that the assets was amply and fully secured by mortgages on good and substantial property, and that they only had to wait five years to get into balance'.⁴⁴ So although Hiltons owed substantial amounts, at other times the Bank of Manchester would have been prepared to wait for repayment and the paper mill would undoubtedly have become a force to be reckoned with. Yet with the bank on the verge of bankruptcy and needing to realise all its assets to repay its shareholders, the sale of the Darwen Paper Mills was its only option.

With up to ten working paper machines, the Hiltons workforce would have included a good number of apprentice trained paper makers, but in 1842 most would have been looking for new employment. One of whom was Yates Duxbury, who together with his sons later ran numerous paper mills in Lancashire and it was Yates and five other former Hilton employees who went 'to tramp upwards of two hundred miles in the hope of finding work'.⁴⁵ Four of them did find work, but neither Duxbury nor his friend Lawrence Harwood were successful and returned to Darwen and who 'sad and disappointed, they tramped back to their home town'. Harwood and two former Hiltons employees, John Carlisle and Thomas Grime, also went on to run their own paper mills. All of whom left a legacy of papermaking expertise in the North West of England which could not have occurred without the foundation of the Darwen Paper Mills.

In normal circumstances choosing relatives as investors is eminently sensible, but in the case of Edward Hilton's former in-laws, the Cartwrights, it was insanity. The family were entombed in debt because of the deceit of Hilton and Burdekin, and for their scam to trick Thomas Cartwright into investing to work, and a scam it surely was, they must have acted in concert. That the lies would be found out in a matter of a few weeks shows downright audacity, but for them it was perhaps the only way to get external investors. However, for the Cartwright's it also led to a most disastrous and destructive business, but unlike the Bank of Manchester, for them it was without any hope of a favourable conclusion.

Appendix 1

Sale of Paper Making Machinery. Charles Edmonstone, a bankrupt, on Wednesday, Thursday, and Friday, the 5th, 6th, and 7th days of May, 1847, at the Darwen Paper Mills.

ALL the Valuable MACHINERY for making Paper, which is in excellent working condition, first-rate makers, and embracing the best modern improvements, comprising three 60-inch, one 54-inch, one 50 inch, and

three 48-inch paper machines, with pulp vats, couchers, dry presses, slitters, and reel apparatus; six drying machines, each with three cylinders; one do. with two do. and one do. with six do.; five 3-bowl calendarers; one 4, one 5, and two 6-bowl do. do.; four hydraulic presses, each 9-inch ram, and three do. do. Each, 10 inch ram; five sets of hydraulic pumps, roll racks, three paper cutting machines by Foudrinier, three dusting machines, conical willow, two cylinder do. and six double cylinder do.; rope cutting machine; eighteen stuff chests, with agitators and gearing; eight lead stills, with cast-iron pans pipes receivers and bleaching chambers; and twenty-one rag beating engines, twenty-two rag washing engines, twenty-one Wrigley's patent regulators for rag engines; patent shaker, Hinton's patent sizing machine, with two brass rollers parting machine, and Hanson's patent (Ipswich) drying machine with seventeen wire cylinders and fans; wrought iron bowking kier cisterns, and pans; wood and stone cisterns, ragstuff and draining bins, wheelbarrows, waggons, railway coal waggons, large grindstone, powerful screw jack, one 12 inch, and one 18-inch raised to 21-inch double-gear lathe, 15-inch double-gear slide lathe, bed 20 foot long, all with face plates, rests and top speeds; upright drilling machine, tools, bellows, and anvils for four smiths hearths, six joiners' benches, bar, rod, sheet, and cast iron, four pairs patent scales, and five large beams and scales, iron and brass weights, copper-plate's stores, driving straps, and several tons of materials for paper making; also a quantity of machinery for bleaching cloth, including two bowking kiers: two bucket dash wheels, pair of lever squeezers, two stiffening machines, stiffening mangle, 9-8ths calender, with three paper and two metal bowls; two 6-4ths friction and glazing calendarers, each with one taper and two metal bowls; pasting bench, drugs, drysalteries, and other effects.⁴⁶

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CONTRIBUTIONS WANTED

Many of you are busily researching the huge variety of different areas that make up our complex and fascinating subject.

Whether it be Watermarks, Papermakers, Paper Mills, Equipment and Technology, Processes, Raw Materials, Paper Usage, Conservation, Social History or any other area, please share your conclusions and your work in progress with the rest of the readership by contributing to *The Quarterly*.

Contributions, however long or short, should be sent to

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PAPER WEIGHT AN IMAGE FROM THE PRESS ASSOCIATION



This photograph, taken on December 9th 1949, was originally released by the Press Association. Unfortunately no photographer is credited for the image. The text that accompanies it reads:

PAPER WEIGHT
December 9th 1949 PAR 16393-1 (-K)

It's not a new parlour game that 19 year old Iris James of Wells, Somerset, is demonstrating in this picture; but with the help of two of her fellow employees at Hodgkin-

son & Co's paper mill in Wookey Hole, Somerset, she is demonstrating the strength of an ordinary piece of the firm's handmade note paper.

Supporting the weight of a person is a real trial of strength for a sheet of paper. The machine-made variety is not capable of it, but handmade paper, still produced by craftsmen, has the requisite strength

FOR FIRST PUBLICATION IN EVENING PAPERS OF SATURDAY DECEMBER 10th.



BAPH Spring Meeting

Call for members contributions to the BAPH Spring Meeting on Wednesday March 1st 2023 at St Brides Foundation.

We need members' contributions, please, large or small.

**If you would like to participate please contact:
Barbara Venables at
bmvenables@gmail.com or
Phil Crockett at
phil.crockett@btinternet.com**

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MILL NEWS (Up to date when printed)

Kimberly Clark Corporation is celebrating its 150th Anniversary this year. Headquartered in Irving, Texas, the multinational has mills throughout the world, including Northfleet, Barrow, Coleshill and Delyn in the UK. Its main brands are Andrex and Kleenex.

LEIPA celebrates 175 years. On July 5, 1847 – exactly 175 years ago – Michael Leinfelder purchased the paper mill in Schrobenuhausen. At the time, he probably had no idea what the small craftsman's business would later become. Today Leipa makes: White Top testliner 700,000 t; Magazine paper 530,000 t; Board 125,000 t; Special paper 21,000 t all based on recycled paper.

West Midlands Fire Service has revealed that the huge blaze which was declared a major incident in Birmingham on June 12 was started by coals from a disposable barbecue, as they warn people to use them responsibly amid the upcoming heatwave. The fire, which quickly spread to the **Smurfit Kappa** site a few metres away in Nechells, Birmingham, took a week-long operation to bring it under control, with more than 100 firefighters and 30 fire engines attending the scene.

Portals has announced the imminent closure of its historic Overton Mill in Hampshire (which we visited during the 2015 Winchester conference) which produces banknote paper. The mill dates from 1922, so is closing during its centenary year. Sale of the mill machinery and equipment is being handled by BAPH member John Wilkie Paper Mill Services Ltd. Contrary to the position in Overton, the company remains upbeat about the prospects for their security paper business at Bathford, Somerset, and the security features business in Milan, Italy, who are not facing the same challenges.

Northumberland toilet roll manufacturer **Essity** has unveiled plans for a new multimillion pound paper recycling plant. The Essity base at Prudhoe Mill is keen to reduce its dependence on virgin wood fibre, which it uses to make products such as toilet rolls, having seen supplies of waste paper drop dramatically in recent years in the wake of technology advancements and offices switching to hybrid or homeworking. Now the company is planning to replace its 50-year-old recycling plant with a new building believed to represent an investment of more than £30m. It will house the latest in recycling technology that will reduce energy costs and increase the company's ability to make new products from recycled fibre.

The year 2022 marks **Saica's** 10 year partnership with **Valmet Global**, that has supported Saica in establishing its PM 11 site in Manchester by using technology to enhance efficiency and reduce the amount of water and electricity used. PM 11, winder and main automation system (DCS) were supplied as part of the project by Metso Paper (Valmet now). The Mill started in January 2012 and exceeded all start-up curve expectations. The two companies have had a very close partnership to develop PM 11 since the initial project phase. Valmet has been supportive in several areas: speed development, efficiency development, electricity and water reduction, training and giving Saica papermaking experts that have been working on similar type machines all around the world.

Runtech Systems has received a repeat order from **DS Smith Paper Ltd.** Kemsley Mill, for a RunEco vacuum system rebuild on PM4 when existing liquid ring pumps will be replaced by four EP600 Turbo Blowers. Delivery also includes detailed engineering, Eco-Drop and EcoSep water separators. With the rebuild, PM4 targets significant energy savings and reductions in CO2 emissions. Ben Jennings, Mill Manager at DS Smith said: 'We have had a successful collaboration with Runtech Systems in improving the energy efficiency of our PM6 and PM3, and we are looking forward to now achieving great results with PM4.'

Built environment consultancy Arup has been selected to lead the transformation of the **Shotton Paper Mill** at Deeside, North Wales, by the site's owner, Eren Holdings. Arup announced that the converted facility will produce 'up to 750,000 tonnes of cardboard each year', as well as holding the capacity to recycle 'all waste paper generated in Wales'. The redevelopment, also involving architects AHR, is expected to bring in £600 million to the local area, creating 660 new jobs. The site is expected to be fully operational by 2024, with the Arup-led team providing project management, design and engineering expertise for its final phase.

Danish Technological Institute has collaborated with Scottish-based **CelluComp** to develop a fibre-based material made from sugar beet. The new development consists of microfibrated cellulose from sugar beet and a newly developed coating that is said to block oxygen, water, and fat. Christian Kemp-Griffin, chief executive of CelluComp, added: 'We have developed a method for extracting micron-sized particles from the sugar beet pulp (a co-product stream from sugar production) which we call Curran. After this process we produce a product that is in granular form – similar to grated cheese. Curran is particularly suitable for paper-based packaging because it makes it particularly stronger and closes the porosity of the sheet, enabling the application of water-based barrier coatings.'

BAPH on FACEBOOK

Interest in our papermaking activities comes from various sources, including FACEBOOK. Please contact either Puneeta or Stephen. (Stevehillpaper@msn.com) (puneetasharma@hotmail.co.uk)

Paper for Paper Blankets, & C

A British patent has been granted to Mr. Harold Jackson of the Oaken Clough paper mills, Garstang, covering the manufacture of a paper having a nap or raised surface produced thereon and applicable for blankets and the lining of clothing, and many other purposes. In carrying out the invention it is preferable to employ a paper prepared from pulp material of greater length of fibre than the average. Upon such paper a soft warm nap is raised by passing the paper through an ordinary raising machine such as employed for raising a nap upon cotton or woollen cloths. In another form a crinkled paper, preferably made from long fibre pulp, is employed and passed through the raising machine and which raises the nap above the crinkled parts thereby imparting an extra body and thickness to the feel of the paper. Paper so treated loses its hardness and crispness and becomes soft and pliable and warm to the touch without cracking.

(Noted by Maureen Green from *The World's Paper Trade Review*: July-December, 1907; page 298)

MIRROR of The TIMES

Wednesday Morning, about three, as a wagoner in the employment of Mr. Rowland, a paper manufacturer at Chilworth Mills near Guildford, was going down Robin Hood Hill near Kingston, he fell off his wagon, being it is supposed asleep at the time, and the wheels passed over his body and killed him on the spot.

(Noted by Ian Dye from *Mirror of the Times* 3rd March 1821)

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BAPH CONFERENCE AND AGM 2022

Cambridge in late September was reasonably warm, but windy, as we gathered at the University Library for our initial visit of the conference. Passing through the fascinating *Darwin Conversation: The Endlessly Curious Life and Letters of Charles Darwin* exhibition, we were greeted by Colin Clarkson, Susanne Paul, Orietta Da Rold, Liam Sims and Heather Wolfe who showed us the Historical Printing Room, mediaeval books from the library collection showing some of the oldest papers in the collection, some beautiful book plates and the wonderful *Illustrations of the British paper manufacture, manufactured by Mr.T.H. Saunders*.

Exiting the august institution we experienced something unusual for England in 2022 – rain. Undaunted, we boarded buses, took taxis or were conveyed by cars to Madingley Hall, a beautiful Tudor country house located just outside the city centre and the venue for our 2022 Conference. A quick towel-down and we were straight into the AGM, then a wine reception which in turn led to the excellent meal and convivial conversation.

After breaking our fast, Saturday started with a trip into central Cambridge and a visit to Penny Jenkins' beautiful home and garden. She generously opened her doors to the BAPH horde, who were fascinated by her work, delighted by her tea, coffee and biscuits, and awed by her wonderful garden. Penny – thank you so much for being such a wonderful host!

Cambridge is such a beautiful city that many took their chance of respite in its taverns and tea shops, combining that with a bit of retail therapy, before getting back for the first technical session of the conference. Miquel Gutierrez Poch commenced proceedings by discussing 19th Century social and economic triggers in the Capellades region of Catalonia; while northern Europe was embracing mechanised paper manufacture, this region expanded its vats and doubled-down on hand-making, at the same time constraining the workforce with tied accommodation and work practices. Orietta da Rold then described paper use in England during the late mediaeval period, and in particular its import from Europe via various routes. Marc Smith continued this theme, discussing the origins of papers found in East Anglian archives, before updating some recent research on one of the earliest mills in England – Fen Ditton, near Cambridge. Heather Wolfe ended this session by looking at the papers of John Spilman, and on some of the potentially nefarious ways he took to protect his royal patent against civic authorities – particularly in the area of rag collection. Four really excellent papers on some very unusual aspects of our subject – Paper – that encouraged much discussion which continued during our conference meal, where Mark Cropper gave a wonderful after-dinner speech about the place of (analogue) paper in a digital age, and included an introduction to the Paper Foundation (of which we will reveal more in a future *Quarterly*).

Too soon it was Sunday, and a final four lectures. Mike Stanyon started with an excellent talk covering the use of wool in cartridge papers and highlighted some very early documents by John Dickinson describing the basics of a hollow cylinder for forming paper – predating his published patent for the Cylinder Mould machine by five years. Don Farnsworth then took over, taking as his subject the surface texture of drawing papers used by Renaissance artists and how it is affected by wool. His work in trying to recreate such papers has involved liaising with sheep geneticists – by forming felts from wool with long coarse fibres he has managed to emulate the rough textures favoured by some of the greatest artists that ever lived. Angela Campbell then kept on with the art theme, discussing Dürer and his connection with the uber-rich Fugger family (see the lead article in this journal), then Peter Bower ended proceedings by discussing the much under-rated brown papers, which have always been core to the English paper manufacturing scene, have been loved by many artists old and new, but which seldom get the respect they deserve from paper historians.

A memorable conference ended with a farewell meal before we all went our separate ways, still trying to work out why we had never considered the importance of sheep genetics to paper production previously! Thanks to everyone for making this such a wonderful event, and in particular to Peter Bower and Barbara Venables for organisation!

Daven Chamberlain

MILL NEWS (contd)

Culture: Historic oil painting turned up at eBay and has been returned nearly ninety years later. The artwork, by Ernest Holden, is a depiction of Grade 2 listed Rock Hall in Boltong, which was once home to a family of paper manufacturers. It was discovered for sale on DERIAN House Children's Hospice's bay shop by campaigners fighting to save the now derelict building. The Charity said it had been anonymously donated to one of its shops.

(Noted by Colin Cohen.)

Kendal-based papermaker, **James Cropper**, has announced the launch of **The James Cropper Colour Academy**. The two-year educational programme has been designed by in-house specialists to develop colour technicians with unrivalled colour knowledge and expertise. Blending technical and colour skill within the business, the Academy aims to build on the prestige paper innovator's reputation for world-renowned colour expertise. Addressing the issue of succession planning, the Academy will ensure cross-pollination of skills and resources between the papermaker's colour lab and its colour blending team. With 176 years of paper-making heritage, James Cropper has established itself as a highly credible colour expert. Its on-site colour lab holds around 2,000 live shades with some 200,000 colours stored electronically.

DS Smith is thinking outside the box by trialling new and innovative materials for its paper and packaging making process which includes straw, daisies, hemp, cocoa shells and seaweed. In an innovative pilot programme, DS Smith and **The Research Institute of Sweden (RISE)** explored how the properties of straw and seaweed could potentially work as a packaging product in comparison to more traditional materials including recycled hardwood and softwood.

Italian machine maker **Toscotec** has just launched a new steel Yankee drying cylinder where heat is supplied by electrical induction rather than steam. It remains to be seen whether this innovation is successful, and we await the first installation in a tissue mill with interest.

UK Paper Mills On-line History Project

This BAPH forum is free to consult and join. It collects and preserves memories, general information and archive locations of UK paper-mills that operated during the twentieth century, many of which are now shut.

www.ukpapermills.org.uk/

INFORMATION SOUGHT

The objectives of the BAPH include acting as a forum for exchange of information and ideas as well as disseminating material relevant to paper history. To fulfil these objectives, requests for information will be published in the NEWS on the understanding that enquirers thank respondents. [As not every member uses e-mail I shall be pleased to forward any information sent for enquirers. Editor]



The Taj from the Paper Works

Does any reader know anything of the PaperWorks situated next to the Taj Mahal in Agra? The photograph illustrated was taken by Dr. John Murray, working for The East India Company as a doctor, who became a celebrated photographer. It is entitled 'The Taj from the Paper Works' and was taken in 1857. Any information would be welcome: please reply to peter.bower@btconnect.com

Money not worth the paper it's printed on

Many of us still like to keep a bit of cash under the mattress for a rainy day. But the habit could leave some out of pocket as Britain switches completely from paper to polymer bank notes.

Pensioners have been warned to check their stash of emergency cash is not about to lose its value when all paper notes are replaced.

Nearly half a million £20 and £50 banknotes ceased to be legal tender on September 30 and will no longer be accepted in shops or businesses, the Bank of England has warned. The £5 and £10 paper notes ceased to be legal tender in 2017 and 2018 respectively.

Baroness Altmann, the former pensions minister, said the elderly needed to be aware that 'the money you've got under the mattress, cash for emergencies, may not be spendable, because we are going to have new notes - they will be the legal tender'. Tom Evans, the director of campaigns and policy at CPRE, the countryside charity, said: 'Many rural villages are now cut off, with no bank or post office and no bus service to the nearest town. Inevitably, this means there will be people holding on to paper banknotes that they will struggle to cash in. While this is unlikely to be a problem in well-connected urban areas, it's yet another reminder that those living in the countryside and getting left behind.'

Sarah John, the Bank of England's chief cashier, said: 'Changing our bank notes from paper to polymer over recent years has been an important development, because it makes them more difficult to counterfeit, and means they are more durable. The majority of paper notes have now been taken out of circulation, but a significant number remain in the economy, so we are asking you to check if you have any at home.'

After the September 30 deadline anyone holding a UK bank account will still be able to pay the notes in, and some Post Offices may still accept them, the Bank said.

Growing inflation also means cash will erode in value more quickly, with prices rising at the fastest rate for 40 years. In May, the rate of inflation rose to 9 per cent, the highest level since March 1982, and the bank has warned that it will reach 11 per cent this year.

There are still more than 300 million paper £20 notes featuring economist Adam Smith, and 160 million paper £50 notes featuring entrepreneur Matthew Boulton, and engineer James Watt, in circulation. It is a year since the Bank issues the first polymer £50 pound banknote, which features Bletchley Park code-breaker and computing scientist Alan Turing. The £50 note was the last denomination to switch from paper to polymer. The first was the £5 note featuring Winston Churchill. It came into circulation in 2016.

The Ivybridge Heritage and Archive Group

Over the years Colin Harris has told us much about **Stowford Mill at Ivybridge** in Devon. Ivybridge has an active Heritage and Archive Group and website. I contacted Andrew Jewell their Website Administrator and he sent me the following information about their Group and the archive relating to paper that they hold:

I worked at Stowford mill from 1980 until its closure and joined the small Ivybridge Heritage Group which was formed as a consequence of the mill closing. All the archive resides in one of the members spare rooms as the heritage centre which we have been promised is taking much longer to materialise than anyone ever imagined. We now have a space earmarked by the developers of the mill site but it is at least another 2 years away.

Speaking with the custodian of the Stowford Mill archive today it is clear we don't have a full inventory of items so this will need to be done. It is at least retained and in a safe location.

To give you some idea of what we hold in the archive here is a brief but far from comprehensive list

- Accounts journals from as early as 1910
- Paper Production Journals from 1916-1953
- Raw Material Purchases 1940s
- Clearing House Account Book (Inter mill transactions) 1960s
- Direct Accounts for Security Papers (All manufacturing mills) 1980 & 1990s
- Production Statistics for Stowford Mill 1955-1970
- Register of Plant & Machinery 1938-1955
- Security Paper sample folder 50+ A4 sample sheets

Their website is at: <http://ivybridge-heritage.org/> contains much information about the town and the mills there.

The Wiggins Teape Archives, now held by in the Paper Foundation at Burneside in Cumbria, also has a considerable amount of material about Stowford Mill.

New book by BAPH member
Joseph Mason:

The Papermakers of Taverham Mill

details of costs and availability
from the author:
jcwm@aol.com

MEMBERSHIP DIRECTORY

To comply with recent legislation, it is essential that – **MEMBERS PERSONAL DETAILS: i.e. name, address, telephone number and e-mail address, also changes to these details, are 'privileged information' for personal use by BAPH members only, therefore only name and interests may be noted in the NEWS. They must not be passed to any outside party.**

**All enquiries regarding membership should be addressed to
Mr. Phil Crockett, 'Littlefield', Christmas Common,
Watlington, Oxfordshire OX49 5HR**

BAPH Membership

I am pleased to say that Membership Renewals continue to come in steadily.

New Members:

Graham WILLIAMS
Florin Press, Kent

Leila SAUVAGE
Amsterdam

There have been one or two 'hiccoughs' with our new website, but all seems to be going well now. This is thanks to much hard work by Terry Wells for which he deserves many thanks and appreciation.

I wish you all well and some interesting history finds for your family and papermaking history.

Phil Crockett (Honorary Treasurer)

FROGMORE PAPER MILL

History came alive for Frogmore Paper Mill on Tuesday 16th August 2022. A visit from Christina Harley, daughter of Mary the only grandchild of Harriet Ann Evans and Charles Longman, gave staff the feeling of real connection to the history we talk about and preserve on a daily basis.

Christina had heard of our fire from a cousin. Suddenly we were in touch with the descendants of John Dickinson, Charles Longman and Sir John, Sir Arthur Lewis and Joan Evans (Aunt Joan). Something recorded in documents became much closer and more personal. Her mother, Mary, remembered visiting Youlbury, the home of Sir Arthur Evans, and was in contact with Joan Evans throughout her life.

Having lost their mother in 2019, and in the process of house clearance, Christina and her siblings withdrew two paintings from auction and offered them to Frogmore. We took possession of a watercolour of Nash Mills House and a portrait of Harriet Ann Evans, first wife of John Evans, delivered in person by Christina. The donation was gratefully received from Mrs Mary E.S. Harley's estate.

We are delighted to add two such significant works to our archive; they will go on display when our new Visitor Centre opens. In return we were able to reveal a few facts unknown to the family, and offer Christina a lightning tour of Shendish Manor, Nash House and St. Lawrence Church, Abbots Langley, wherein tombs of John Evans and his first wife, Harriet Ann Dickinson with ashes of their son, Sir Arthur Evans. Finally The Booksellers Provident Retreat erected by John Dickinson.

Sue Woolnough, Education & Design Manager at Frogmore Paper Mill.
<https://www.frogmorepapermill.org.uk>

Printing Innovation – the laser “deprinter”

A new device, developed by Barak Yekutieli, an Israel-based entrepreneur and co-founder of Reep Technologies, has been described as a laser “deprinter” — a machine that deletes the printed word. It removes (evaporates) a special ink printed onto a sheet of paper, without damaging the substrate. The sheet can be re-used at least 10 times, and the inventor claims that it will make so-called “circular printing” much cheaper than conventional processes. Their main challenge is to keep the same sheet of paper in good condition after it's been reprinted and handled 10 times — let alone 50 or 100. But Yekutieli, who is planning to launch a circular printing service for businesses and governments next year, expressed confidence that customers will adapt to the need to return the paper for reprinting in reasonable shape.

TURKEY MILL, KENT IN 1854



More early photographs of paper mills are coming to light. Arthur Julius Pollock (1835-1890) took this collodion image of Turkey Mill in 1854. Photography was a hobby for Arthur Pollock who was a doctor who worked at both

Charing Cross Hospital and the Foundling Hospital in London for most of his working life. (The Pollock Photograph Album, The Getty Museum, 84.XA.1271.103)

LETTERS TO THE EDITOR

Over the years we have published some very interesting and informative letters from readers on matters arising out of articles in *The Quarterly* as well as other matters. We would like to be able to establish this as a regular feature of each future issue so please keep your letters coming.

The Editor

64 Nutbrook Street, London SE15 4LE

REWARD NOTICE

BANK of ENGLAND NOTES.

£1,500 REWARD.

WHEREAS the DIRECTORS of the BANK of ENGLAND have recently discovered that some of the Paper manufactured for their Notes has been feloniously taken from the Mills of Messrs. PORTAL & Co., at Laverstoke, near Whitechurch, in Hampshire, and that such Paper has been used in the fabrication of Forged Notes,—

NOTICE is hereby given, that a REWARD of **£500** will be paid to anyone who will give such information as shall lead to the apprehension and conviction of any Person concerned in the stealing of the Paper; and a further REWARD of **£1000** will be paid to anyone who shall give such information as will lead to the apprehension and conviction of any Person concerned in the fabrication of forged Notes by means of such Paper.

Information to be given to Mr. Superintendent HODGSON, Police Office, Old Jewry, London, or to Messrs. FRESHFIELDS and NEWMAN, 5, Bank Buildings, London.

By Order of the Directors,

E. WELSH, *Assistant Secretary.*

*Bank of England,
August 16, 1862.*

PRINTED AT THE BANK OF ENGLAND, JOHN COE, SUPERINTENDENT.

Reward Notice issued by the Bank of England after the theft of unprinted banknote paper from Portal's Laver-

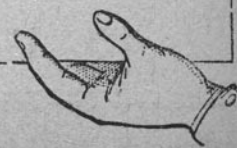
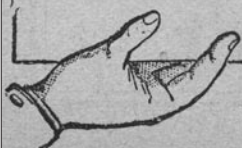
stoke Mill near Whitechurch in Hampshire in 1862, from *The Bankers Magazine* Volume 22, 1862, page 576.

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Printed and Published by W. JOHN STONHILL, 58, Shoe Lane, LONDON, E.C. Oct. 31, 1890.

THE STORY OF GUM ARABIC

R.A. Laing



Figure 1: *Acacia gum trees – gum collecting.*

From The Quarterly Magazine, being the House Organ of Samuel Jones & Co. Ltd, Vol.II, No.1, Jan. 1920, pp.2-14.

It may be interesting to those who are constantly using Gum Arabic to know a little of the country it comes from, how it grows, is collected, and brought home and the aid of a few photographs taken amongst the natives helps better than writing to bring the details before your readers. Khartoum, the capital of the Soudan, and familiar to every Englishman for its historic defence by General Gordon against its siege by Mahdists, is the centre of all the districts of the Soudan, and to it are brought the supplies of gum from the out-lying parts, stored and eventually shipped to all parts of the world.

To get to Khartoum there are two ways, by the Nile Valley, or by the Red Sea. The first takes you by rail from the Suez Canal about 1600 miles through Cairo to Assouan, where the great Dam has been constructed on the Nile, from there a two days sail to Wady Halfa, and then across the desert to Khartoum, gazelles running quite near the train.



Figure 2: *Gum trees (acacias) with the gum dry and ready to pick.*

The other way is going through the Suez Canal and down the Red Sea to Port Soudan, and from there by train to Khartoum.

It is, however, 500 miles south from here, where the gum trees grow, and where El-Obeid the rail-head is reached, and although there is not much talk of it at present the railway will be continued, to meet the Cape to Cairo line. El-Obeid is now the chief centre and market for the gum trade which is the most important of all exports from the Soudan. There is a wide belt of gum producing trees, Acacias, right across Africa, through Nigeria and the Senegal, and the gum from the different districts differs in quality, probably owing to the variety in soils and other natural causes.

The Acacia trees (Figure 1), are not very large, and but for their terrible thorny nature are easily reached to gather the gum.

The natives tap the trees with small narrow hatchets, and the fluid gum flows through the slit, and dries in the sun



Figure 3: *The Arabs gathering the dried gum from the acacia trees.*

in round bubbles on the bark (Figures 2 & 3). These when dry, are collected and packed in large leathern saddle bags, of which a camel can carry two, one on each side. When at El Obeid, I met a gentleman who arrived from Nigeria, having driven in a small two-wheeled gig 1,600 miles in four months, with 2 servants and 6 ponies, and he told me that he had been the whole distance amongst gum tree forests, one near Lake Chad of 50 square miles in extent. None of these had ever been tapped, and they can never be of any use till a railway brings them somewhat nearer for camel transport. When sufficient gum has accumulated and camels procured, which during the war has been a very serious difficulty, owing to the demand for transport in Egypt, Syria, and Mesopotamia, a caravan is formed, and after a more or less lengthy journey, sometimes weeks, arrives at El Obeid.

The camels are made to lie down in the market enclosure, and are relieved of their loads, and then depart light. Camels are the most unsympathetic animals existing; they never seem to appreciate a kindness or attention; or to know their owners, and one has to be careful amongst them as a bite or a kick is a sufficiently unpleasant experience. When made to lie down, or get up, they give vent to the most agonising groans, and what might be vicious bad language, but once set going they are easily controlled.

The great difficulty in the camel transport is the want of water in the desert, and if the caravan gets out of ordinary routes, they have to depend on the rainwater stored in the Tebelti trees, whose huge trunks are excavated and converted into reservoirs, where the camels are watered. The drivers also take supplies of very large green water



Figure 4: *El Obeid, Gum Market, The Square.*



Figure 5: *The Gum Market at El Obeid. Mud House is the Government Record Office.*

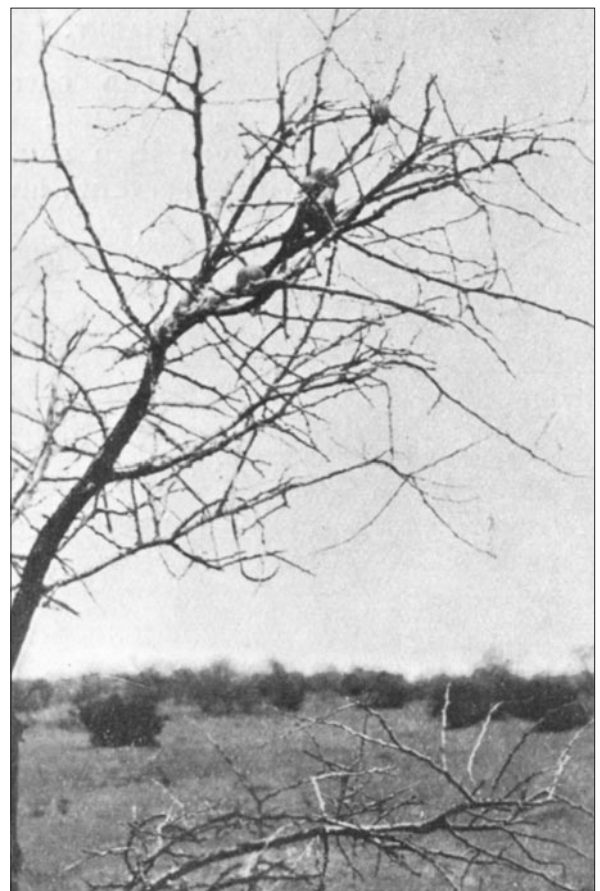


Figure 7: *Fluid gum dried on the bark of the acacia.*



Figure 6: *Acacia gum trees.*



Figure 8: *Each sack being weighed individually and officially.*

melons which in favourable seasons grow in large quantities in the desert and serve as both food and drink for their animals. The gum having now been piled in the market place, every native owner and every buyer, native or European, is obliged to employ so many brokers to complete the purchases.

The brokers are clad in long white cotton garments. Whenever the gum has been sold, the whole community of buyers and sellers, brokers and natives, flocks to the Government office to record the transactions.

The gum is then filled from the leathern saddlebags into ordinary sacks, each being weighed individually. The sacks (about two cwts each) are carried on men's shoulders and removed to the merchants premises for cleaning, etc ...

The gum is next turned out, and carefully gone over by women, who clean it from bark and stones. It is then thrown into a heap and turned over, so that every sack is alike in quality.

There are up to three hundred or so women picking and cleaning gum, and many of these are West African Natives on their way to Mecca, to which many of them devote their whole life to going and returning working when they can, to make something to help them on their journey. Several of them had their babies with them laid out on the floor behind and quite happy with a piece of gum each. When the mother leaves the factory the baby is fastened on to her hip by a cloth round the waist.

Finally the gum is again packed into sacks and sent off to the Railway Station to be put on the train for Port Sudan



Figure 9: Gum weighed and sewn up.

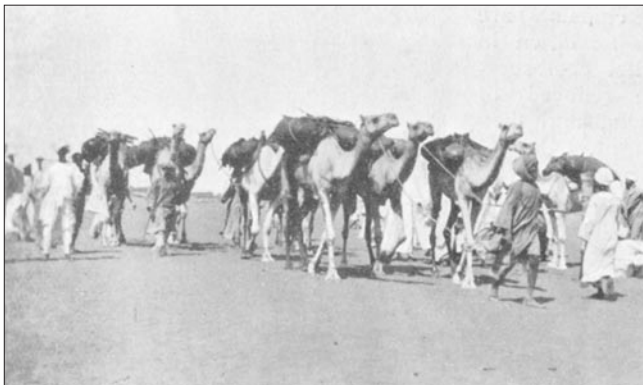


Figure 10: Gum caravan arriving at El Obeid.



Figure 11: Camels unloaded, and departing light.



Figure 12: Tebelti trees.



Figure 13: Purchases waiting to be weighed over by an official.

for shipment, or to Khartoum to be stored.

The climate of the Soudan, in the district where the gum trees grow is very trying for white people, for a lengthy period, but most delightful and invigorating for a few months visit. Whilst in this country we are chilled and frozen during November to April, out in the Soudan, you never have a drop of rain, and day after day cease-

less sunshine, which makes one long sometimes for a shower. It does get rather hot sometimes, but one does, not grumble at that for a time, 108 in the shade is a grateful reminiscence.

I conclude with pictures of a goods train and a passenger train on the Soudan Government Railways.



Figure 14: Gum being carried from market to merchants' premises.



Figure 18: The gum being filled into ordinary sacks.



Figure 15: The Gum Market at El Obeid in full swing. Native owners, European dealers, and Native brokers in long white garments.



Figure 19: Gum being carried on men's shoulders to merchants' premises.



Figure 16: A group of native owners and brokers, and European buyers.



Figure 20: Gum being cleaned from straw, wood and stones.



Figure 17: The market at El Obeid, closed. All interested flocking to Government Office to record sales.



Figure 21: Gum being cleaned by women from straw, wood and stones.



Figure 22: Gum thrown on heap to be bulked.



Figure 24: El Obeid – goods train.



Figure 23: El Obeid goods station.

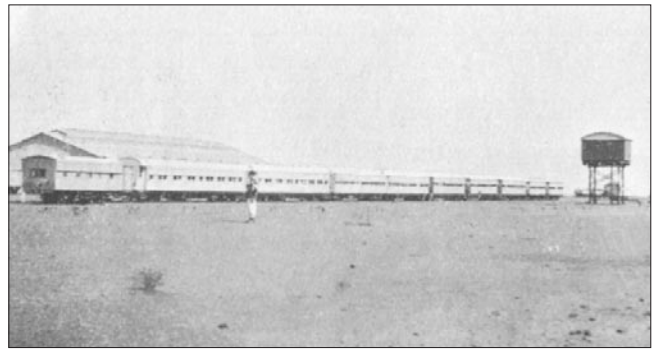


Figure 25: El Obeid – passenger train.

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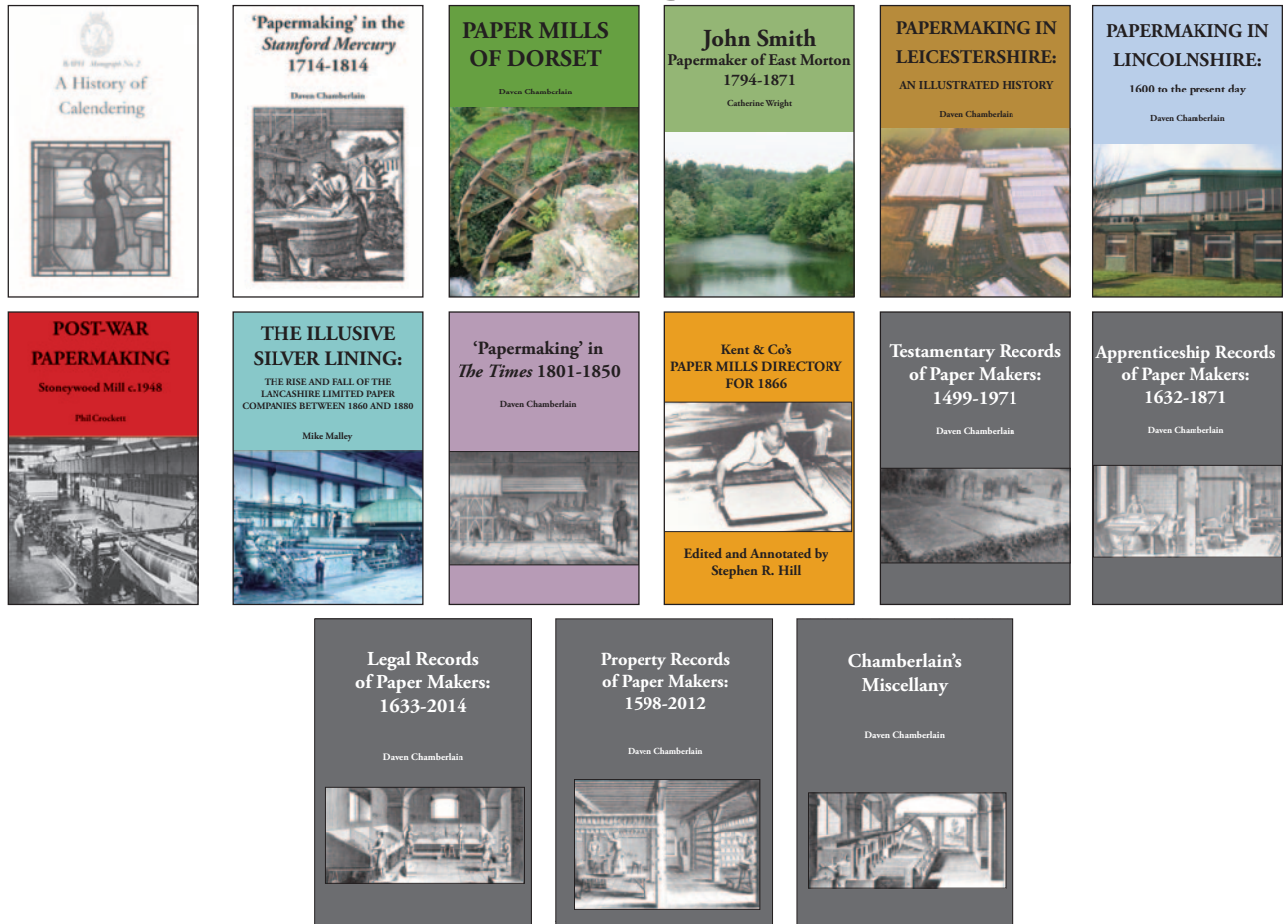
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THE BACON FAMILY OF WAREHAM

Daven Chamberlain

In 2015 I produced a monograph,¹ in which I introduced the Bacon family, papermakers of Wareham. In a recent visit to this beautiful Dorset town I discovered a new grave monument to the family, and so was inspired to research them a little further. This short article corrects one mistake in the monograph², and adds new information about the family.

Wareham, a small Dorset town with very old origins, housed three mills, two of which made paper: West Mill (a few hundred yards outside the Saxon walled town) and Carey Mill (about a mile further away). Current information for both mills shows they were operating in the 1740s, with West Mill having the slightly earlier documentation. For this mill, a single name, that of Robert Bacon, can be found on a range of documents dating from 1741 to 1807;³ then, with the instigation of the Excise listing in 1816,⁴ Henry Bacon is shown, only for him to leave by 1820 when the Excise lists show the surname of Snelgar (from a family who previously operated at Carey Mill) as proprietor.⁵ So the Bacon family ran West Mill as a combined paper and corn mill for nigh on 80 years.

The new gravestone

In the south aisle of Lady St. Mary Church, Wareham, fairly near to the West (tower) entrance, is a gravestone set into the floor, commemorating several of the Bacon family (Figure 1). It is rather hard to read because since

being laid the pews on either side have been raised slightly on a wooden dais, and heating pipes have been installed, so obscuring some of the wording on an already damaged grave monument. Nevertheless, enough is visible and legible to report that it commemorates the death of the earliest Robert Bacon to be documented as papermaker of the town, along with that of his first wife, the unusually-named Bula. No occupation is listed, but his residence at Westmills is confirmed.

Here lieth the body of BULA Bacon, the wife of Robt. Bacon, who departed this [life July] 1743.

Here also lies the body of ROB^t BACON of Westmills [husband of Bula] Bacon who departed this life 27th day of Feb. 1759. [Also Bula ye Daughter of Robt + Mary [Bacon Died Mar — 1763]

[Material in square brackets shows the suggested transcription of what is indecipherable.]

The engraving that commemorates Bula is much deteriorated compared to that for Robert, which may reflect the sixteen year gap between the two deaths, and may also be down to differences in the skill of the carvers; it could also have been caused by weathering if the stone was placed in the graveyard between the different engravings.⁶



Figure 1: Gravestone commemorating several of the Bacon family, inside Lady St. Mary Church, Wareham.

The Bacon family

Previously my research into the Bacon family was restricted to entries in the various Wareham church registers. For this article I have used the Ancestry database to look further afield, and to investigate what happened to the family both before and after their tenure at the paper mill.

Research shows that the early Bacon men tended to wed women from outside of their immediate vicinity, with the marriage ceremony taking place in the woman's parish church. The first Robert Bacon who can be identified as a papermaker was married to Bula Hand in Loders, West Dorset, well away from any centre of papermaking (the nearest at the time being Beaminster). The marriage was by Licence, with Robert described as 'of Wimborne Minster' and Bula 'of Weymouth'; here may lie a clue to the origin of Robert's occupation, since Wimborne was an important local centre of paper manufacture, although the earliest known record dates from 1732 – a full decade after this marriage took place. However, the exact date on which papermaking started here, and elsewhere in Dorset, is unknown.

The Wimborne Parish Register for the early eighteenth century shows entries for two males with the surname of Bacon: John Bacon⁷ and Robert Bacon⁸. Were they related? Almost certainly. Were there mills in existence in at the time? Walford Mill, a corn mill, was certainly there,⁹ and it is a fair assumption that others were operating too. If either of the Bacon family worked at a mill, they may or may not have been papermakers; corn milling is actually a more likely occupation, and moving forward two decades to Wareham West Mill, we know that both

papermaking and corn milling occurred at the site, and that extant documents show members of the Bacon family as both papermakers¹⁰ and corn millers¹¹.

The confirmed papermakers (Figure 2) at West Mills are Robert Bacon (I) married in 1722; his son Robert (II) married in 1761; and the latter's son Harry who was born in 1765. It is also likely that Robert Bacon (III), the son of Robert Bacon (II), was a papermaker as well, but given the overlap of dates, currently there is no documentation that can verify this suggestion.

Going forwards, post-papermaking, members of the Bacon family remained in Wareham and the surrounding area, and were recorded in several national Censuses. So we find Bula Bacon (born 1766) in the 1841, 1851 and 1861 Census documents, in which she is described as 'Independent' then 'Land Owner' and finally 'Landed Proprietor';¹² the Parish Register documents also record her burial in 1861, age 95 years.

The 1841 Wareham Census shows Robert Bacon (age 34) married to Ann (age 24), both natives of Wareham. They were both married earlier that same year, and the parish register shows Robert as a Baker, both husband and wife were illiterate and signed by making a mark, and Bula was present as a witness,¹³ this being almost conclusive evidence for Robert being a member of the papermaking family. In 1851 they had two children, George (8) and Thomas (5), living at 76 West Street, and now Robert was described as an Agricultural Labourer, suggesting that the family fortunes were in decline.¹⁴ At present the parentage of this Robert Bacon is unknown; he is most likely the offspring of Robert Bacon (III) (born 1762) from

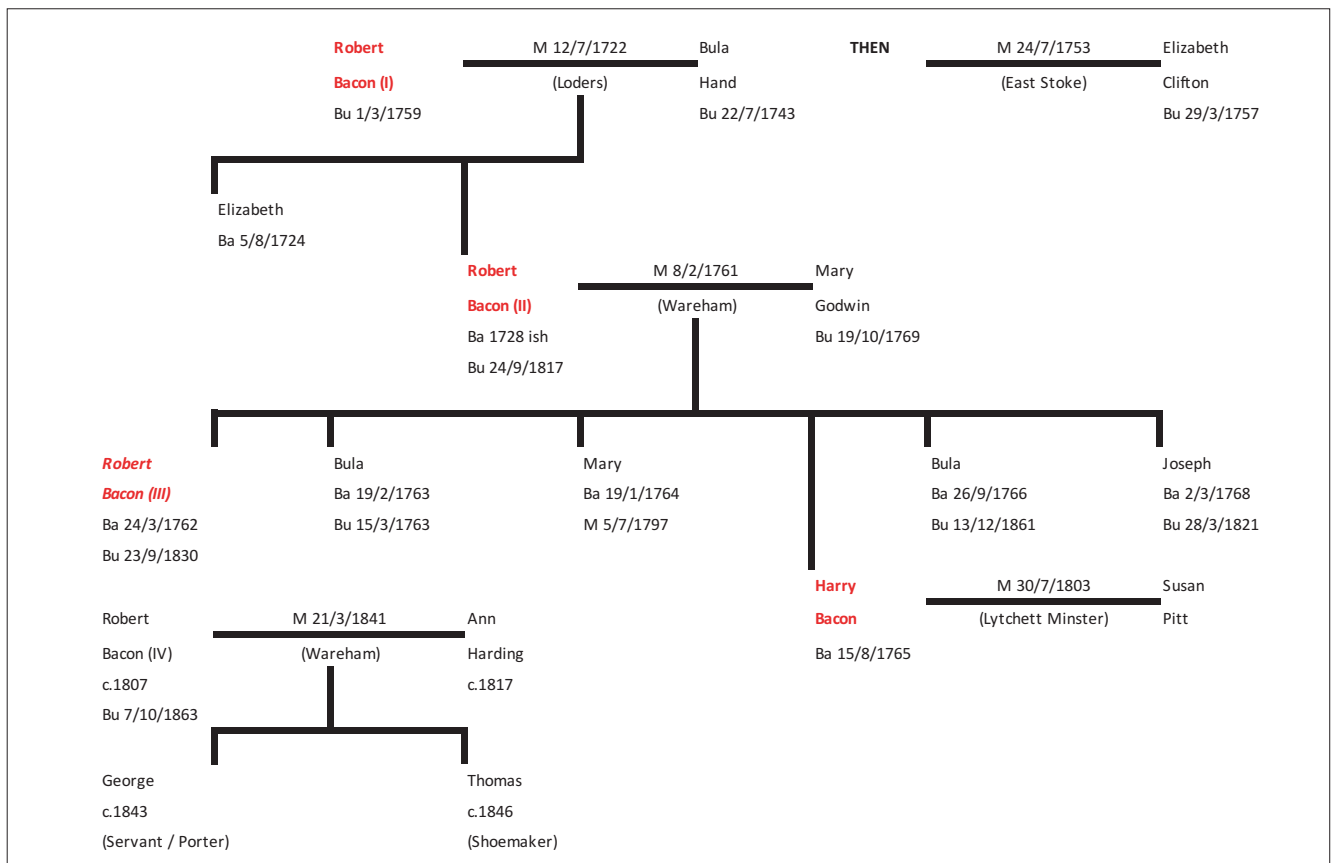


Figure 2: Family tree of Wareham-based Bacon papermakers.

an as yet unidentified marriage, or of Harry Bacon (born 1765) from his marriage with Susan Pitt.

Meanwhile, the 1861 Census for Wareham Lady St. Mary ward shows Andrew James Bacon,¹⁵ and the 1881 Census for Wareham shows James Bacon (54, Agricultural Labourer, born Poole) and family was present,¹⁶ while in the same year the Wareham Lady St. Mary Parish in the East Street Almshouse could be found Helen Bacon (13), also born in Wareham. Slightly further afield, in Weymouth, was John Bacon (56, Coast Guard, born Poole) – almost certainly a relative of James Bacon. The lineage of all three of these Bacon family members remains a mystery.

In conclusion, people with the surname Bacon, almost certainly members of the extended family that were originally Paper Makers and Millers, can be found in Wareham almost a decade after the family ceased to operate West Mills. However, the exact relationship of these people to the papermakers has not been ascertained; neither has the ultimate demise of the last papermaker (Harry) been discovered.¹⁷ Furthermore, none of these latter-day Bacon family members attained the status of those that operated West Mills in their heyday.

The Bakon family

Currently, this is where the research ends, but I am indebted to George Purcell who published an excellent article on Downton Mill in *Quarterly* No.116.¹⁸ In this he discussed a will of Thomas Bakon, papermaker at Downton (south east of Salisbury), dating from 1679.¹⁹ Just thirty years later, a bill pertaining to William Snelgar, another papermaker at Downton, was issued. As yet no connection between Thomas Bakon and the Bacon family of Dorset has been found; but we know that the Snelgars of Downton moved subsequently to Wareham Carey Mill soon after the Bacons became established at Wareham West Mill. Therefore, it is very tempting to suggest that the Bacon family of Wareham did indeed come from the Wilshire area. Unfortunately, there are a huge number of Bacon/Bakon listings in a great many Wiltshire registers so unravelling their lineage, especially from 17th Century registers, is nigh-on impossible – but it is noticeable that some in particular derived from Salisbury (where the Downton Bakon was buried) and from Fisherton Anger, which was close to West Harnham / Bemerton, another Wiltshire papermaking area to the north west of Salisbury.

Notes and References

1. Chamberlain, D., *Paper Mills of Dorset*, BAPH Monograph 6, 2015.
2. In the monograph is the burial of Robert Bacon on 24/9/1817 age 39 – an as yet unknown member of the Bacon family. In fact the age should have been 89, making this Robert Bacon (II) who was a papermaker, married in 1761, therefore born soon after the marriage of Robert Bacon (I) in 1722.
3. Churchwarden's Book, 1753, Lady St Mary, Wareham; Dorset Poll Book 1807.
4. Excise General Letter (EGL) 8/10/1816.
5. EGL 4/7/1820.
6. Inoted already in Ref 1 that the Snelgar gravestones in this churchyard have deteriorated significantly, and are rapidly becoming illegible.
7. Children of John Bacon, found in the Wimborne St. Giles Parish Register, are: Mary (1/11/1723); Thomas (2/21724); Susanna (29/3/1727); John (6/12/1734).
8. Wimborne Minster Register, Elizabeth his daughter, 5/8/1724. The transcription of this parish register also shows a Marriage of Robert Bacon to Elizabeth Thomas on 10/12/1717; however, the writing on the Parish Register is quite poor and hard to read, and may actually be Robert Baron.
9. www.walfordmillcrafts.co.uk
10. Sun Fire Insurance Policy (SFIP) No.90357, Vol.61, 5/3/1741 (Robert Bacon, Paper Maker); SFIP No.402839, Vol.269, 21/9/1778 (Robert Bacon, Paper Maker and Miller).
11. SFIP No.312778, Vol.214, 29/6/1772 (Robert Bacon, Miller); Dorset Militia List 1798 for Wareham shows Robert Bacon 5ft5in Miller, liable to serve, and Henry Bacon 5ft4in Miller, claiming exemption.
12. 1841 Census, Holy Trinity Wareham, District 2, Bula Bacon, 70, West Street. 1851 Census, Wareham Holy Trinity, Bula Bacon, 83, 8 West Street. 1861 Census Wareham Lady St. Mary District 1, Bula Bacon, 94, South Street. In all cases she had a house servant living in the property.
13. Wareham Lady Mary Parish Register, 21/3/1841; Anne was listed as a Servant.
14. The 1871 Census for Wareham shows Ann Bacon (56) Widow, a Servant, and son Thomas (25) a Shoe Maker. Meanwhile, son George (29, Servant) had married Sarah (29, Dress Maker) and they had four children (Ann 6, Kate 4, Ellen 2 and Thomas 1m). The 1881 Wareham Census, Parish of Holy Trinity, shows George Bacon (38, Porter) married to Sarah (39, Dressmaker) with six children ranging from 14 to 1 year; the family lived in Trinity Lane and everyone was born in Wareham. In 1901 we find Thomas (59, Shoe Maker) and new wife Eliza (61, born Warwickshire) with Louis (24), Albert (20) and Emma (23) all born in Wareham.
15. Andrew James Bacon, age 30, a Carter, born in Longfleet, near Poole, was married to Maria (age 27) from Corfe Mullen, and they had three children, born in Lychett and Wargrave, both villages in the vicinity of Wareham.
16. Camey Carey (location). Maria (50, Wife, born Wimborne), Albert (23, Agricultural Labourer, Poole), Edith (21, Wareham), Frederick (17, Agricultural Labourer, Wareham), Walter (16, Agricultural Labourer, Wareham), Julia (14, Scholar, Wareham), Bessie (13, Scholar, Wareham), Alice (11, Scholar, Wareham), Emily (8, Scholar, Wareham).
17. The death of Harry Bacon at the Chelsea Royal Hospital, and his burial in Kensington and Chelsea on 20/9/1839, age 73, is recorded. The age certain fits with this being Harry Bacon, son of Robert Bacon (II), but if it is, why he ended up in London is a mystery.
18. George Purcell, "The History of Downton Paper Mill", *The Quarterly*, No.116, Oct. 2020, pp.15-20.
19. The will mentions a brother, Robert Bakon, and his wife, Alline; two cousins, Fennes Bakon [the last letter of the Christian name is difficult to decipher] and Elizabeth Bakon; and ultimately his loving wife, Sibbell Bakon. His total estate was valued at over £106. The will was dated 17/7/1679; the inventory 24/7/1679; and Thomas was interred in July 1679 [day not stated] at St. Thomas, Salisbury.

IN MEMORIAM



BRIAN ATTWOOD (1927-2022)

Brian Attwood, doyen of the UK paper industry for almost eight decades, passed away on 8 July after several months of declining health. Brian was born on 10 September 1927 and started work at the age of 14 as a junior in the St. Anne's Board Mill records office in September 1942. Having left school at 14 Brian continued his education at Merchant Venturers' Technical College and Bristol College of Technology by evening class-

es and day release, which was not always easy during the war years because Bristol was heavily bombed.

After the war ended Brian served as a radar technician in the Royal Air Force, and his demobilisation was held up by the Berlin airlift which started in June 1948, so he ended up serving for two and a half years. He then re-joined St Anne's in the newly formed research department.

Work on the simulation of multi-cylinder drying led the company to build pilot plant – the first major pilot plant for studying forming in the UK. In turn this led to investigating new forming methods for multi-ply board, and ultimately to development of the now-famous Inverform process, the world's first commercial twin wire forming process for which Brian's name would forever be synonymous (Figure 1).

Brian stayed with St Anne's until the mill closed in 1980, ending his time as Director for Process and Technology; he then became a consultant and formed St. Anne's Paper & Paperboard Dev. Ltd. With this company he travelled the world consulting on: general forming developments, multi ply forming developments, pressing and drying developments, dry forming (air laying), pilot plant design, paperboard manufacture and management issues. In particular he was active in designing equipment and assisting in pilot plant operation.

He was active worldwide, and was a member of the British Association of Paper Historians (BAPH), Canadian Pulp & Paper Association (CPPA), European Liaison Committee for Pulp and Paper (EUCEPA), Finnish Forest Product Engineers' Association (PI), Paper Industry Technical Association (PITA), Royal Society of Chemistry (RSC), and Technical Association of the Pulp & Paper Industry (TAPPI). He was National Chairman of PITA (1982-1984) (Figure 2), represented PITA on the executive committee of EUCEPA, was a director of the Fundamen-

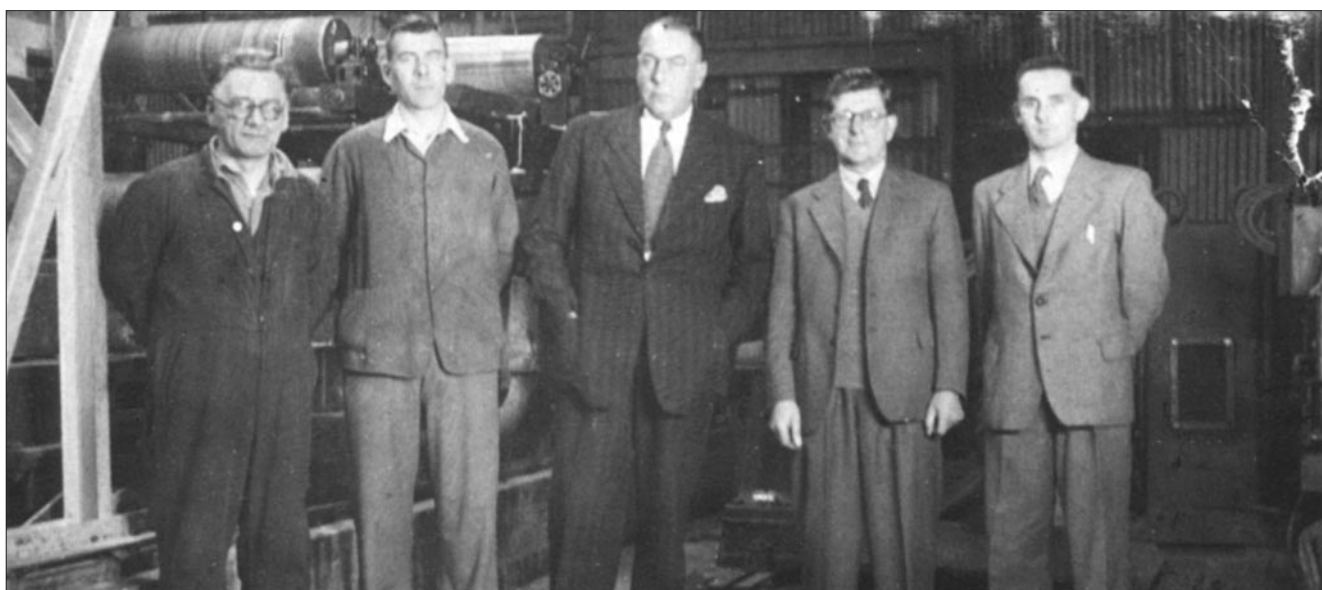


Figure 1: *The original Inverform team at St. Anne's, from (l) to (r): R. Fothergill, H. Taylor, R.J. Thomas, S.F. Smith and B.W. Attwood. (R.J. Thomas, S.F. Smith and B.W. Attwood were all awarded the Technical Section Silver Jubilee Medal at various times in their careers.)*

tal Research Committee (FRC) and a director of TAPPI.



Figure 2: Past and Present PITA Chairmen: (l) T.S.R. Parkin investing (r) B.W. Attwood, 1982.

Over his illustrious career he received numerous awards including: City and Guilds Insignia Award; Technical Section Jubilee Medal (1969 – especially for his paper

“Papermaking as a technology: A survey with comments on the British contribution”, *Paper Technology*, Vol.10, No.5, October 1969, pp.362-368); TAPPI Paper and Board Division Medal (1977); PITA Gold Medal (1987); TAPPI Fellowship (1987); the Paper Industry Gold Medal (1994); TAPPI Gunnar Nicholson Gold Medal (2000); and he was inducted into the Paper Industry Hall of Fame (2000). In addition, he held singularly or jointly over 30 patents, was a prolific writer and presenter, travelled widely and was unfailingly curious about everything and always courteous to all he met.

Brian believed in the importance of knowing the history of an industry, hence his involvement with BAPH; long before the formation of BAPH he was author of “The BIAS Paper Mills Survey” (*BIAS Journal*, No.3, 1970) which charted the mills around the Bristol region from early times. He also acted as a Trustee for the now-defunct National Paper Museum. In addition he was a champion of education, and was a Trustee and examiner for the Julius Grant Award administered by PITA.

Outside of work his interests included travel, the arts (he painted when time allowed), and loved music and books. He was also an epicure and always gregarious; conversation did not tend to flag when he was in company. He will be missed by his spouse, Janet, whom he met at St. Anne’s Mill where she worked in the laboratory, and with whom he had recently celebrated his 61st wedding anniversary, and by his wider family of Paper Industry colleagues.

Daven Chamberlain

EDGAR MONTAGUE AMPHLETT’S CBE



The Confederation of Paper Industries (CPI) are moving premises and while clearing out their offices they discovered a CBE decoration, awarded to Edgar Montague Amphlett MC, a former General Secretary of the Association of Papermakers and Boardmakers who was awarded the CBE in the Queen’s Birthday Honours of 1955. The CPI would very much like to trace any surviving members of his family and return the CBE to them. He had been awarded the honour for his services for his work on the National Advisory Council on the Employment of the Disabled.

Edgar Montague Amphlett and his wife Jeanne Sophie Amphlett lived at Newbarn in Kent and had at least one son, Philip John Amphlett, born in 1921, who served in the Special Operations Executive in the Second World War, having parachuted into France on August 16 1943 to carry out sabotage, as a member of the Scullion group. After the successful outcome of this mission he had been arrested by the Gestapo and imprisoned at Fresnes. He was subsequently deported to Germany and executed at Flossenburg concentration camp on March 29 1945.

If any reader knows of any surviving members of the Amphlett family, please contact the editor or Barry Read, of the Paper Industry Technical Association, 0300 3020 150 or email barry@f-t-a.eu

IN MEMORIAM

HER MAJESTY QUEEN ELIZABETH II

(21st April 1926 – 8th September 2022)



Watermark portrait of HM Queen Elizabeth II, produced by Portals for the Coronation in 1953.



In 1962 Queen Elizabeth II visited the Portal mill at Overton, commemorating the 250th anniversary of the founding of the company. She also visited Portals' Laverstoke mill where she, in keeping with an old tradition, fed the fishes in the river (above). She lunched with Sir Francis Portal at their original paper mill, Bere Mill. below).



IN MEMORIAM



CHRISTINE WOODS (1946-2022)

The world of paper and particularly the world of wallpapers have lost someone really rather special. Christine Woods, one of the earliest members of BAPH: she was a delight to know, conscientious, modest and kind, stubborn and incredibly funny with a very dry sense of humour.

Christine was born in Walthamstow on the 23rd of November 1946 to Bill and Cis Woods. Christine's sister, Susan, was born 6 years later. Susan was the sporty sister. Christine by contrast was quiet, studious and academic. She excelled at English but art was her passion and she studied History of Art at Farnham Art School. Her first husband Tony was a childhood friend. They had gone to Primary School together and she was married in her early twenties for 7 years.

Her ability to communicate with everyone owed everything to her background. With a BA(Hons) in Textiles from West Surrey College of Art, Farnham, and an Art Teachers' Certificate from the University of London Institute of Education, from 1973-85 she had served as Senior Technical Assistant at Middlesex Polytechnic, for much of this time not only meeting the demands of staff and students and lecturing elsewhere, but also continuing her own education, latterly as a PhD candidate researching the British Silk Association and Sir Thomas Wardle. In 1985 she became Archivist



Figure 1: Christine and her VW in the 1960s.

at Arthur Sanderson & Sons Ltd, just in time to curate their 125th anniversary exhibition and write the accompanying catalogue. Here too, crucially, she immersed herself in learning about their production processes, gathering a good understanding of all of these, including block printing.

Christine will be long remembered for her impact as Curator of Wallpapers at the Whitworth Art Gallery, a position she held from 1987–2012. She not only cared for the Gallery's collection of historic and modern wallpapers but was the moving force behind the establishment and promotion of the University of Manchester as a centre for the study of this subject. As the only full-time wallpaper curator in the country, she rightly came to be regarded as representing Britain in this arena, both in Europe and elsewhere around the globe. On her arrival at the Whitworth she was that rarity: an insider in every respect. Attuned to the needs of students as much as lecturers, conservators as well as curators, and industrial design studios together with their corporate bosses, Christine became the central conduit through which exchanges flourished.

One expression of her energetic dedication to "spreading the word" was her key role in the foundation in 1986 of the Wallpaper History Society (WHS), for which she served as Chair and, from 1990 until 2016, editor of *The Wallpaper History Review*. Her legacy remains not only in the WHS, but equally in the Textile Society, for which she played the essential role of founding Secretary from 1982 and member of the editorial board until 1988. It is no exaggeration to say that her combination of superb organisational skills and wry goading set the Textile Society on sound footing.

In all these achievements Christine was above all, an egalitarian. She was generous and kind to all, whether

the most senior of professionals or the most proletariat of curious visitors to the Whitworth. Her scholarly interests over the past two-plus decades were equally even-handed, often focused on the less fashionable wallpapers, when a curator of her standing might be expected to pivot their research only around 'high end' products. Her contribution to *The Papered Wall* (Thames & Hudson 1994 and 2005) documented 'Proliferation: Late 19th Century Papers, Markets and Manufacturers' as no one else could. One consistent topic was washable mass-produced wallcoverings, called sanitary papers, much to the amusement of some wallpaper connoisseurs.

Undeterred, her spirited defence of such topics is captured in the title, 'Artistic and sanitary: wallpapers in a spin,' this time for a National Trust audience at the V&A in 2000. Twelve years later she boldly presented 'The Challenge of Cheap Paper' to the International Paper Historians' congress in Basle (published in the *IPH Yearbook*, Vol.19, 2012). She contributed various things both to BAPH meetings and to *The Quarterly*, including "It's only Wallpaper", (*The Quarterly*, No 48, December 2003) and "Those hideous sanitarines: tracing the development of washable wallcoverings" (*The Quarterly*, No 26 April 1998 and *The Quarterly* No 27, July 1998.)

Despite her prolific output of exhibitions, publications, conference papers, gallery tours and study days, what is most memorable about Christine was her warmth and the capacity to bring people from different arenas together. She brought to her tasks a determination to succeed and an irresistible combination: brilliance of mind and brilliance of smile. She is sorely missed.

In the late 70's she met David Greysmith, a lecturer at Middlesex Polytechnic which was the beginning of their life together. His story of how they met gives a flavour of them both.

"I thought I should provide a bit of background. In the inconceivably distant past, two lives were about to collide, rather like the Titanic and the iceberg. On a smaller scale of course, though it didn't feel like it at the time. Employed by Middlesex Polytechnic (as it was then) I was involved with putting up the degree show of the 3rd year students, in the rather splendid venue of Heals, in Tottenham Court Road.

It had been raining heavily all day. All my colleagues had gone for lunch. I was delayed and I felt peckish, so I made one of those life-changing decisions. I decided to risk the rain and pop out for a pint. On my way to the exit, clutching my umbrella, I spotted a lone figure up a ladder, female, attractive, very. "Hello" I said, adding wittily "Still at it?" On the spur of the moment I heard myself say "Fancy some lunch, my treat?" Her expression didn't change except I thought I detected a sudden glimmer of what I can only call mirth. I was half way to the exit when I heard her say "OK".

I didn't know it but I was launched on the rest of my life.

Conversation was difficult through the crowds of

Tottenham Court Road. We came to a junction where an enormous puddle blocked our way. Christine prepared to leap across at the same time as I reached out to rescue her from the puddle. Unfortunately, I only succeeded in pushing her in the back, which caused her to sprawl forward into it. I helped her to her feet and then to my astonishment she burst out laughing. Encouraged and amazed I brushed her down as best I could. We went into a pub and the ridiculous thing was I had forgotten my wallet and she had to pay for lunch.

The rest is history."



Figure 2: Christine at the front door of *Weathervane*, her house in Suffolk.

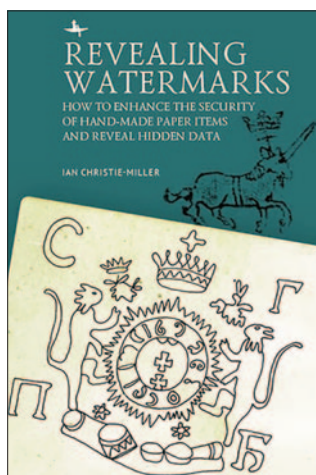
In the mid-1980s Christine and David bought *Weathervane*, a cottage facing the beach in Southwold, Suffolk. The house became a focal point for family gatherings and holidays over the years. Everyone helped out on the never-ending DIY project. It was like the Forth Bridge and needed to be painted every year. *Weathervane* was a labour of love and reflected Christine's hard-work, determination and attention to detail. It provided a place for humour, laughter and lasting memories.

Peter Bower

Acknowledgments

Many people have shared their memories of Christine and this obituary owes the much. I would particularly like to acknowledge the words of Mary Schoeser and to thank Luke Greysmith for the provision of both information and images.

BOOK REVIEW



REVEALING WATERMARKS: HOW TO ENHANCE THE SECURITY OF HAND-MADE PAPER ITEMS AND REVEAL HIDDEN DATA

Ian Christie-Miller

Published by Academic Studies Press, Brookline, Mass, USA 2020. 90 pages, 77 b&w illustrations, 1 table, Bibliography, Index. ISBN: 9781644696248. Price \$99 or £70.99. Available from Matthew Charlton Sales, Marketing, & Open Access Manager Academic Studies Press, 1577 Beacon Street Brookline, MA 02446 USA matthew.charlton@academicstudiespress.com

Watermarks reflect the very stuff of the origin, date, distribution, composition, history, and culture of paper-based items. Digital imaging of watermarks releases the research potential as widely as the internet itself. One example is the digital “fingerprinting” of paper in order to enhance the security of items, such as valuable and vulnerable maps. *Revealing Watermarks* offers detailed instructions of this process, through the author’s own PaperPrint method, and by means of the case study of a sixteenth-century watermark—a crown from the arms of Danzig—it illustrates how cultural influences spread and have endured across the centuries, in this case from Sweden to Russia.

BAPH member Ian Christie-Miller has been developing methods and equipment for retrieving and recording watermarks for very many years. His latest book on the subject is a very clear and readable discussion of the processes involved and their potential.

Christie-Miller is a former RAF pilot and teacher. During his London PhD he devised the Early Book Imaging System for watermark research and security enhancement. Publications include *Traicté de la Cabale*, (2007), *72 In His Name* (Academic Studies Press, 2019), and articles on the *Electronic British Library Journal*. His peer-reviewed monograph “Revealing Watermarks: How to Enhance the Security of Hand-Made Paper Items and Reveal Hidden Data”, published by the American Academic Studies Press in August 2021, is an example of a scientific work in where theory and practice complement each other.

Any document or book is dated according to a combination of paleographic features including the paper, handwriting, decorations, binding, the actual composition and content of the text of the book, various types of records on it. However, as a rule, it is paper that gives a document or book the most accurate and chronologically narrow dating: after all, a manuscript cannot be created earlier than the production date of the paper on which this book is written. In addition, the watermark can allow you to determine the place of production, and often to identify a particular papermaker and date of manufacture.

A watermark is the most important attribution marker of manuscripts, letters, documents, handwritten and printed books. The first watermarks appear on documents from the second half of the 13th century, and this method of marking was practiced until the middle of the 19th century. To date, a significant array of descriptions and images of watermarks of various degrees of detail has been accumulated, however, serious scientific research on this topic is still infrequent in both domestic and world historiography. The identification, classification and attribution of filigrees is an extremely science-intensive process.

One of the most interesting parts of the book is a detailed consideration of one of the most common watermarks of the 16th century, relating to the coat of arms of Danzig. The evolution and transit of this watermark from Sweden to Russia, through the Baltics, is an excellent illustration of the historical significance of watermarks in documentary sources. Christie-Miller covers the study of this issue in a comprehensive manner, even the coats of arms of such Russian noble families as the Sheremetevs, Boborykins, Kolychevs, Konovnitsyns, Neplyuevs and Yakovlevs, in which borrowing from the Danzig coat of arms can be traced. The scientific consultant of the book was, among other things, the Russian researcher heraldist A.N. Khmelevsky (editor of the scientific and educational Internet project “Gerbovnik.ru”). The practical testing of the results of the study became possible thanks to the author’s collaboration with the Vilnius University Library, the University of Amsterdam and King’s College London.

Ian Christie-Miller’s monograph is valuable and unique precisely for its methodological and its practical orientation. The author studied and used the experience of many university research schools and, based on their developments, created his own methodology. Based on modern information technologies, it allows you to detect and recognize watermarks on paper of any density and quality. The author attaches particular importance to the letters that accompany watermarks, while we see a serious attempt to decipher the emblems and letter combinations.

This fascinating and readable account of the process of identifying early printed books by analysing the watermarks of the paper used has a justifiable place in every library containing early printed material.

Peter Bower

WANTED



HAVE YOU SEEN THIS MAN?

Man in a hat standing under an arch, with the date 1601 or 1609 above.

Has anyone come across this watermark? It would be very useful to know more about its origin and the date of making. Dated watermarks at this period are relatively rare. It was found in two variants in 9 sheets of cream laid medium weight writing paper used by Richard Baxter (1615-1691) one of the prominent

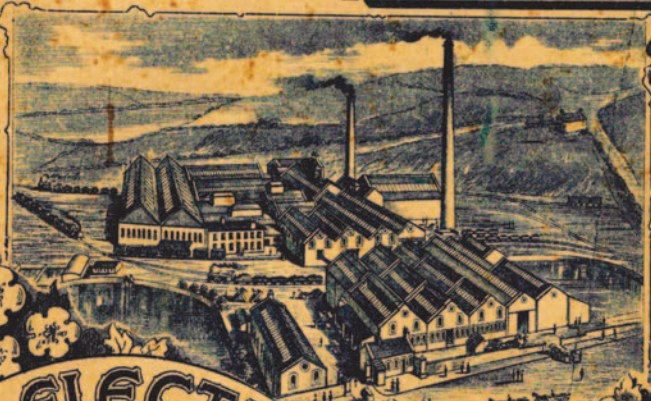
English nonconformist divines, in Dr Williams Library, London. Despite repeated searches here and in Western Europe, no other examples of this watermark have been found.

If anyone can contribute any information please email Jane Giscombe at janegiscombe@icloud.com
Please copy your email to Peter Bower at peter.bower@btconnect.com

21
GUARANTEED — THAT THIS PAPER WILL NEITHER SMUDGE
NOR SPOIL THE WRITTEN MATTER, AND THAT IT WILL ABSORB
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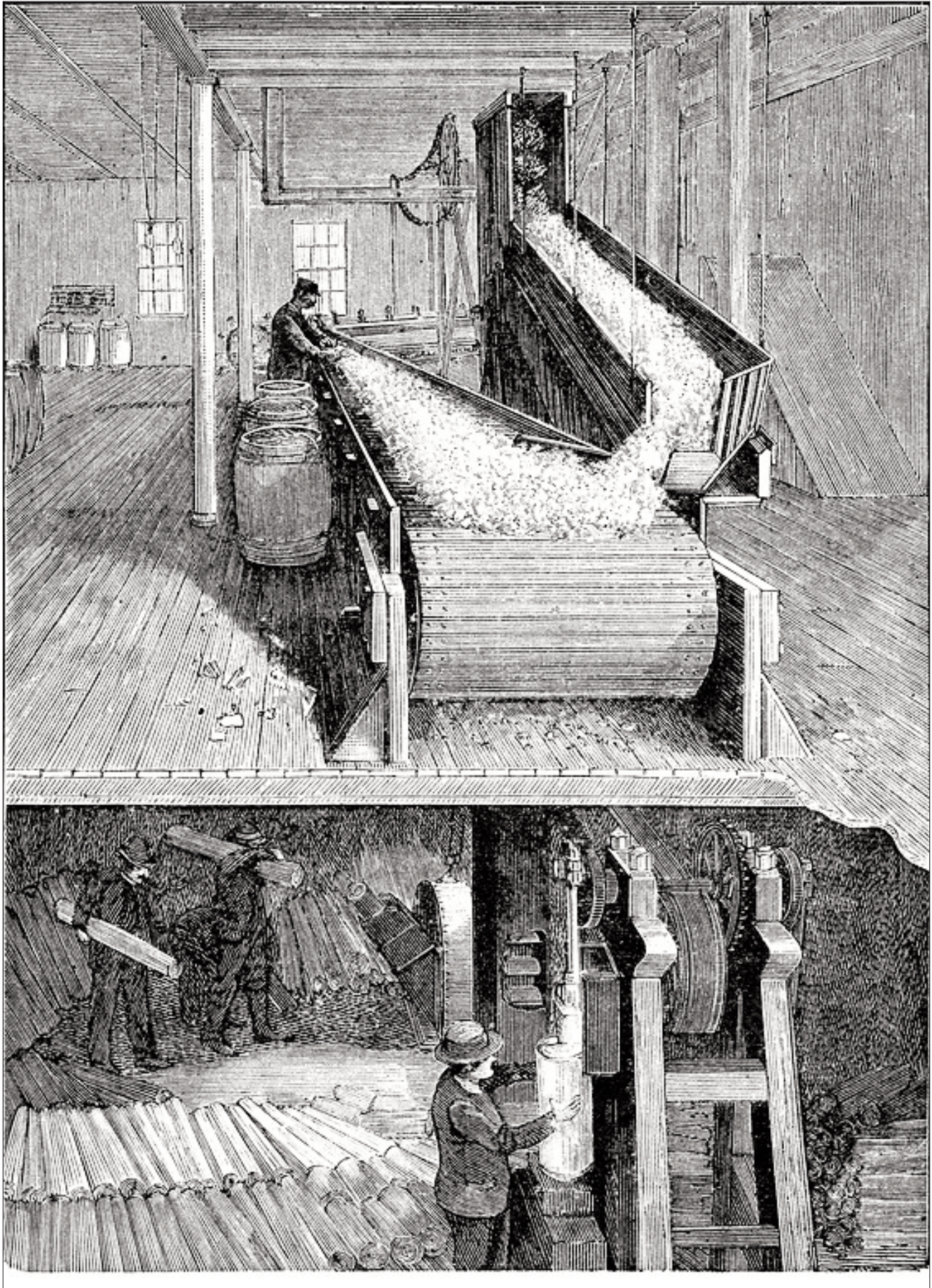


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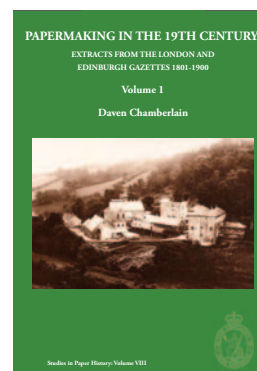
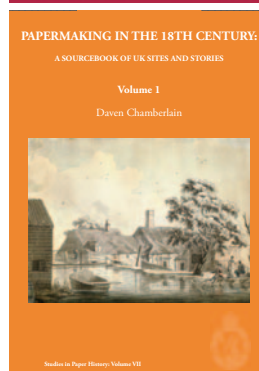
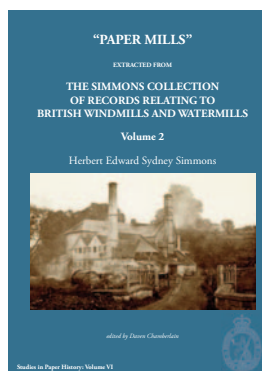
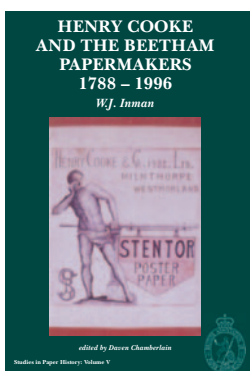
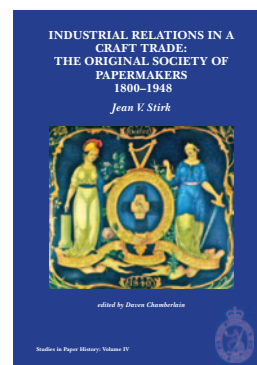
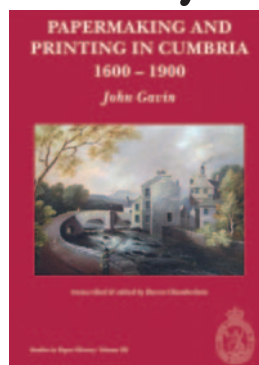
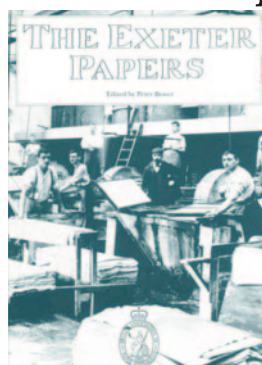
Robert Craig & Sons

Sample folder of *Patent Spongia Blotting* paper made by Robert Craig & Sons, at Caldercuix Mill, Aidrie, Dalkeith, Scotland. On the back the blotting paper is described as being "Made by an entirely New and Patented Process." having "Double the absorbing power of ordinary Blotting paper and therefore most economical." (With thanks to Stephen Allen)



Workers at a paper mill converting logs (bottom) into wood chips, with the wood chips sorted and graded by size on a conveyor belt (top) and placed in barrels before being used to make paper. Artwork from the 22nd volume (second period of 1898) of the French popular science weekly *La Science Illustrée*, Paris, 1898.

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