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Paper Manufacture in Central and Eastern Europe Before the Introduction of Paper-making Machines

A múltat tiszteld a jelenben és tartsd a jövőnek.

(Respect the past in the present, and keep it to the future)

Vörösmarty Mihály (1800-1855)

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Introduction

During the 1991 Conference organized at Prato, Italy, many interesting facts on the manufacture and trade of both paper and books in Europe, from the 13th to the 18th centuries, were discussed. Nonetheless, there was a lack of information about making paper by hand in Central and Eastern Europe, as it was highlighted during discussions.¹ This paper is aimed at connecting east central and east southern parts of Europe (i.e. without Russia and Nordic countries) to the international stream of development in European hand papermaking before introducing paper-making machines into countries of the discussed region of Europe. This account directed to Anglophones is supplemented with the remarks

¹ Simonetta Cavaciocchi (ed.): *Produzione e Commercio della Carta e del Libro Secc. XIII-XVIII. Atti della „Ventitreesima Settimana di Studi” 15-20 Aprile 1991. Firenze 1992, pp. 202f.*

introducing into the technique of making paper by hand in Europe and characteristics of European hand-made papers.

The genuinely European art of making paper by hand developed in Fabriano and its further modifications

The artisans of Fabriano have laid a solid foundation for the successful development of the European papermaking craft, and they propagated their art of making paper by hand in other parts of medieval Italy. Thanks to so fruitful efforts of the Fabriano master papermakers, and other Italian papermakers as well, paper became able to successfully compete with parchment, its older rival, and could be supplied outside Italy.² As early as in 1350, the Fabriano paper was applied as far as in Finland for writing a document.³ Also the Fabriano art of papermaking spread from Italy to other European countries, starting local papermaking in them, or, like in Spain, re-starting and developing that craft in accordance with the Italian method.⁴

According to Gasparinetti, the Arab prisoners settled in a suburb called 'Borgo Saraceno' probably introduced artisans of the city of Fabriano to the Arab technique of making paper by hand. And the Fabrianese made fundamental improvements in this craft, such as: the application of stamping hammers to reduce the rags to pulp for making paper by hand, the sizing of the paper by means of animal glue, and the watermarks. At that time Fabriano was famous for its wool-weaving and its manufacture of cloth. In his opinion, the first makers of paper at Fabriano adopted the idea of applying to their needs a battery of hammers driven by water (by means of the usual water wheel) from the 'valchare' as the 'gualchiere' or fuller's mills were then called. The papermakers

² Andrea F. Gasparinetti: Paper, Papermakers and Paper-mills of Fabriano. In: Emile J. Labarre (ed.): Zonghi's Watermarks (Aurelio & Augusto Zonghi – A.F. Gasparinetti). Hilversum 1953, pp. 63-81; here pp. 73-79.

³ Nils J. Lindberg: Paper comes to the North. Sources and Trade Routes of Paper in the Baltic Sea Region 1350-1700. Vantaa 1998 (IPH Monograph Series, Vol. 2), pp. 81ff.

⁴ José C. Balmaceda: La Contribución Genovesa al Desarrollo de la Manufactura Papelera Española. Fuengirola 2004 (Colección Apapiris).

of Fabriano used glue, obtained by boiling ‘scrolls’ or scraps of animal skins, to sizing their paper, which method was probably suggested to them by the local tanneries. The introduction of first European watermarks in Fabriano was linked to applying metal wires by Fabriano masters to making the laid cover in the mould for forming paper by hand.⁵

However, less attention has been paid to the alkaline character of early European papers made in accordance with the Fabriano method, and to carbonate pigments present in those papers. Probably the first reference to the presence of calcium carbonate in old European hand-made papers was published in 1935 by Budka in his article on the Balice papermill near Kraków, established by Seweryn Boner in 1518-1521.⁶ It was Barrow who carefully documented such characteristic features of old European hand-made papers in his very thorough studies into the permanence and durability of book papers, which were fully completed by his ‘W.J. Barrow Research Laboratory Inc.’ and published in 1974.⁷ Barrett was able to demonstrate the important role played by both the high calcium content and the amount of gelatine, detected in early European hand-made papers, in relation to their strength and permanence.⁸ Nevertheless, the analytical data obtained for historical paper specimens are usually insufficient for reconstructing the technology of their manufacture. And such inventions of the Fabriano masters’ as the alkaline papermaking and the unlikely process of filling the paper with carbonate pigments without, however, adding the pigments to the fibrous slurry before the forming process, as in the typical

⁵ Gasparinetti (cf. note 2), pp. 69-72. Richard L. Hills presented many additional and important remarks on technical innovations introduced to papermaking in Fabriano, in his essay: *Early Italian Papermaking. A Crucial Technical Revolution*. In: Cavaciocchi (cf. note 1), pp. 73-97; here pp. 79-83, 86-92, 93f. A slightly modified version of that contribution was published in: *IPH Congress Book, Vol. 9 (1992)*, pp. 37-46.

⁶ Włodzimierz Budka: *Papiernia w Balicach [The Papermill in Balice]*. In: *Archeion 13 (1935)*, pp. 30-50, here p. 41f.

⁷ W.J. Barrow Research Laboratory, Inc., Publication Number Seven: *Permanence/Durability of the Book – VII. Physical and Chemical Properties of Book Papers, 1507-1949*. Richmond VA 1974, pp. 15ff, Appendix B: Tables 2 and 3, Appendix C: Figures 1 and 4. – Timothy Barrett, who developed a major complementary study surveying old papers manufactured between 1400 and 1800, additionally confirms Barrow’s results: *Early European Papers/Contemporary Conservation Papers. A Report on Research Undertaken from Fall 1984 through Fall 1987*. In: *The Paper Conservator 13 (1989)*, pp. 3-108.

⁸ Timothy Barrett: *Coded messages in historical handmade papers*. In: *IPH Congress Book, Vol. 11 (1996)*, pp. 86-91.

process of paper-filling, were still a bit of a puzzle, keeping in mind that first documented use of filler (china clay) in European papermaking took place in England about the year 1807.⁹

Quite recently, a careful analysis of the technological data present in historical sources was published, documenting that lime (calcium hydroxide) introduced during the stamping process created such alkaline conditions under which paper was formed, and the calcium hydroxide retained in the paper must have reacted with atmospheric carbon dioxide to produce particles of calcium carbonate even though no pigment was used. The specific use of lime in the stamping process was most likely first mentioned in a work by Francesco Maria Grapaldo (*De partibus aedium*; GW 11331) printed in Parma probably in 1494 and often reprinted during the first half of the 16th century. The technical details in the Regensburg Regulations, another important source, which probably dates from the second half of the 16th century, show that making paper by hand in the Bavarian mill was carried out in accordance with the Fabriano technology. It was concluded that the lime retained in the paper was responsible for stabilizing the glue in its structure, and some other remarks about the Fabriano method of making paper by hand were additionally made in that contribution.¹⁰

A newest attempt to recapitulate information on the technique developed in Fabriano is supplemented with scanning electron microscope (SEM) micrographs showing carbonate pigments in the structure of an alkaline paper, dated 1548 and made in Italy, documenting the presence of such pigments both on fibre surfaces and in the fibre-wall. The latter is an example of the so-called ‘internal filling’ or ‘fibre loading’, mastered so early in medieval Italy. In the

⁹ Dard Hunter: *Papermaking. The History and Technique of an Ancient Craft*. New York 1978, p. 490.

¹⁰ Józef Dąbrowski, John S.G. Simmons: Permanence of early European hand-made papers: some technological aspects and the evidence of F.M. Grapaldo (c. 1494) and of the Regensburg Regulations (XVI 2/2 c.). In: *IPH Congress Book*, Vol. 12 (1998), pp. 256-263. A slightly modified version of that paper was published in: *Fibres & Textiles in Eastern Europe* 11 (2003), No. 4, pp. 8-13; see also: http://www.fibtex.lodz.pl/40_06_08.pdf

attempt, the following steps of making paper by hand, developed in Fabriano, are specified and described in detail.¹¹

There is a lack of illustrations depicting details of the papermaking technique in medieval Italy. Probably Elias Porcelius gave the best presentation of making paper by hand in Europe; however, his book was published at the end of the 17th century. (Nürnberg 1689).¹² (Fig.1)

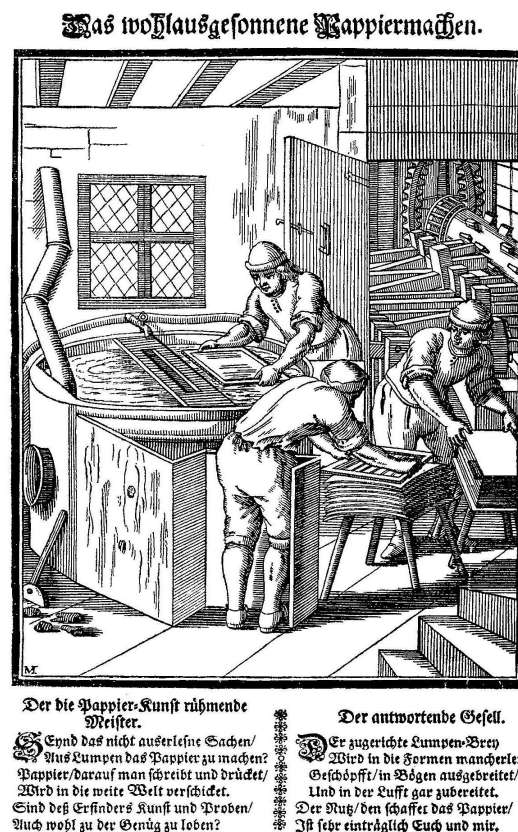


Fig.1: Making paper by hand in Europe of the 17th century as presented by Elias Porcelius, after Roemer (cf. note 12).

The ‘vatman’ is forming a sheet of paper by scooping with mould the fibrous slurry (‘stock’ or ‘stuff’) from the vat. The second artisan, known as the ‘coucher’, is depositing the wet sheet of paper from the mould-frame upon a

¹¹ Józef Dąbrowski: The Genuinely European Technique of Making Paper by Hand Developed in Fabriano: an Interpretation Through the Mirror of Paper Technology. In: Giancarlo Castagnari (ed.): L’Era del Segno. The Era of the Sign. Vol. 2. L’Impiego delle Tecniche e Dell’Opera dei Cartai Fabrianesi in Italia e in Europa. The Use of Techniques and Work by Papermakers from Fabriano in Italy and Europe. Fabriano 2007, pp. 415-470.

¹² Klaus Roemer: Geschichte der Papiermühlen in Westpreußen und Danzig, nebst einem Anhang für Netzedistrikt. Münster 2000 (Quellen und Darstellungen zur Geschichte Westpreußens, Bd. 30), p. 158, Abb. 36.

piece of woven wool cloth ('felt') somewhat larger than the size of paper. The third workman, known as the 'layman' (or 'layer'), is separating (after the pressing) each sheet of paper from the interleaving 'felts' and placing the sheets in an even pile. Behind the artisans, the wooden hammers of the stamper (usually three hammers per trough) are depicted. The hammers are raised at their heads by the cams fixed on a waterwheel axle made from the long trunk of a single tree, and there was no need for gearing, therefore. Heating device may be seen at the left of the picture by Porcelius. That invention made during the 17th century, to warm the stock in the vat, speeded up the manufacture of paper by increasing the dewatering rate of the stock during forming the sheet of paper. As perceived in the picture by Porcelius, both the vatman and the coucher are using the mould-frames at the same time. This was possible because a professional set of the European mould consisted of one deckle and a pair of the mould-frames with ribs into which the laid cover (or 'face') was fixed.¹³ (Fig.2)

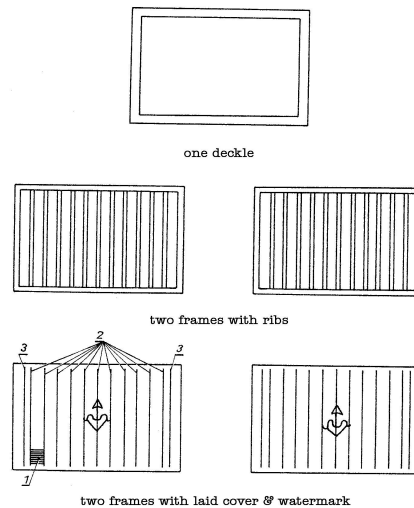


Fig.2: A set of the European mould: one deckle but a pair of the mould-frames with ribs, according to Dąbrowski and Siniarska-Czaplicka (cf. note 13).

In the lowest part of the picture, the mould-frames are covered with a single layer of the metal laid cover to which additional thin wire in the form of design is attached to watermarking the sheet. Details of the laid cover which later are visible in the sheet of paper held up to the light: 1) laid wires, 2) chain lines, 3) auxiliary chain lines not supporting by a rib, the so-called 'water bar', perceived only in early European papers.

¹³ Józef Dąbrowski, Jadwiga Siniarska-Czaplicka: *Rękodzieło Papiernicze* [The Papermaking Craft]. Warszawa 1991, p. 152, Fig. 39.

After stirring up the stock in the vat with the paddle, the vatman took a mould-frame, put the deckle on top and scooped up some stock. The mould was shaken by the vatman to remove superfluous stock over the far side of the deckle and ‘to close the sheet’ before the stock settles upon the cover of the mould-frame. Having finished the forming, the vatman removed the wooden deckle, and then passed the mould-frame with the newly formed sheet along the wooden platform, called the ‘bridge’, to the coucher. After that, the vatman started to form another sheet with the second (empty) mould-frame, using the same deckle. The coucher put the mould-frame, with its thin moist sheet, against the inclined bar, called the ‘asp’ (also ‘ass’ or ‘horn’), fixed into the bridge. The coucher choose the correct inclination of the mould-frame required for quicker or slower dewatering, depending on the kind of paper under production. (The bridge across the top of the vat is perceived in the picture by Porcelius; however, the asp was omitted.) When the newly-formed wet sheet of paper had properly solidified upon the mould-frame, the coucher inverted the mould-frame. After that, he deposited the wet sheet of paper upon a felt, by pressing it against the felt with a slight rocking motion. Next, he pushed the empty mould-frame along the bridge to the vatman. Another felt was placed by the coucher on top of the sheet of paper he had couched off previously. These activities were repeated over and over, until a pile of usually 144 sheets of paper, had been formed and couched, each sheet of wet paper separated from the next by a piece of felt. The pile of paper and felting, called ‘post’, was placed in a press to remove the excess water.

So close cooperation between the vatman and the coucher was very efficient, judging from later established norms of daily work as regards moulding of paper from one vat: 6 reams in a full day and 5 reams in vigil. It means, 2880 sheets of paper was made in a full day of work, counting the ream of writing paper as consisting of 480 sheets. The norms were specified in the Polish document of 1546, and later they were laid down in the Regensburg

Regulations.¹⁴ A key issue in such efficient cooperation between the artisans was carefully prepared stock. Rag fibres should not be beaten too highly, only to enable even formation of the sheet of paper, during its moulding. The stock prepared from the rags fibres only slightly beaten dewatered too quickly, resulting in defected sheets; however, highly beaten pulp dewatered too slowly, not only during the moulding by the vatman, but also during draining before the couching step, causing a disturbance of that cooperation between the vatman and the coucher. So the rag fibres should be beaten in a way suitable to the type of paper under production.

According to a recent understanding, the rag fibres (relatively long, smooth, and stiff) during their beating in aqueous suspension are transformed into shorter, fibrillated, and more flexible fibres. The scanning electron microscope (SEM) micrographs documented the fibrillation of both inner and outer layers of the cell-wall structure after the beating process. The fibrils separated from the outer layers of fibres (called ‘fines’) are responsible for decreasing the dewatering rate of the fibrous slurry; on the other hand, flexibility (and even plasticity) of the internally fibrillated fibres is decisive for contact areas between fibres. Such contacts become the bonding areas holding the fibrous network together, after subsequent pressing and drying of paper sheets.¹⁵ The very soaking of the fibres in water, even when prolonged, cannot produce these effects, and therefore such mechanical actions upon fibrous slurry are required before moulding the sheet of paper. The formation of hydrogen bonds between the surfaces of plant (cellulose) fibres is the final act of consolidation of the wet sheet of paper accomplished without any additional adhesives. However, the hydrogen bonding is not water resistant, and therefore by simple wetting with water the sheet of

¹⁴ Józef Dąbrowski, John S.G. Simmons: *Ad perpetuam rei memoriam...: The Royal Regulation of Polish Papermaking in 1546*. In: *IPH Congress Book, Vol. 10 (1994)*, pp. 44-51. Also in Polish and English version in: *Przegląd Papierniczy 52 (1996)*, pp. 267-272, 329-335.

¹⁵ H.W. Emerton: *Fundamentals of the Beating Process*. Kenley 1957, pp. 133-144. Edward Szwarcztajn: *Przygotowanie masy papierniczej [Stock preparation for papermaking]*. Warszawa 1991, pp. 108-115, 131-139.

paper backs to a state approaching that of the wet sheet itself. The strength of dry paper derives from both the strength of individual fibres in the network and the bond strength. The latter is related to the fraction of fibre surface that is bonded in the sheet, dependant mainly on the beating degree of plant fibres.¹⁶

In fact, the stock preparation started from the fermentation (or ‘retting’) of the rags. A duration for the retting depended on the quality of the rags. The finer rags fermented less quickly than the coarser ones, and old cloth more slowly than new. The different grades of rags were sorted out from the rags supplied to the mill, therefore. The finest and whitest materials were most valued and reserved for top quality paper manufactured without a considerable wastage in the work. In the technique of making paper by hand elaborated in Fabriano; however, the rag fibres were beaten only in such a moderate way which assured the even formation of paper sheets and enabled the efficient cooperation of the crew at the vat, resulting in the high productivity. It means, the beating process was not aimed at full development of strength properties of the paper, and it was the gelatine size, which considerably strengthened the paper and diminished its porosity. This also led to the required degree of sizing being achieved, i.e. the resistance of a paper surface to penetration of water and aqueous solutions, with the ink used for writing among them. The word ‘size’ means here a thin substance used as a glaze or filler on porous material, such as paper in this case, and therefore the word ‘size’ here refers to the role playing by the gelatine size in reducing the rate at which paper absorbs water and aqueous solutions. However, the term does not refer to the strong bonding ability of the gelatine size, which additionally developed the strength of paper sheets. The adhesive character of the gelatine size is clearly expressed in the names of ‘size’ and ‘sizing’ used in other languages, e.g., in Italian (*colla, collaggio*), French (*colle, collage*), German (*Leim, Leimung*), and Polish (*klej, zaklejanie*). In modern terminology such kind of sizing process invented in Fabriano, and its modern

¹⁶ Derek H. Page: A Theory for the Tensile Strength of Paper. In: Tappi 52 (1969), No. 4, pp. 674-681.

modification as well, is called ‘external sizing’ to distinguish it from ‘internal sizing’, introduced in machine papermaking, in which the size is added to the fibrous slurry before forming the web of paper. This was initiated with the rosin (colophony) size, and recently synthetic sizes are applied in very small quantities. All of them considerably reduce the wetting ability of paper, acting as a water-repellent and imparting a high sizing degree to the paper sized in this way, also to porous papers. However, these positive effects are accompanied with a negative influence of such hydrophobic sizes on the strength of paper, in contrast with the sizing developed in Fabriano, guaranteeing both such a high sizing degree of the paper and so considerable strengthening of its fibrous structure.

The Italian technique provided a sound basis for further development of European papermaking, which progressed within the frame of that technique up to the invention of the paper-making machine in 1798/99, with a few important improvements during those four hundred years. The technical change of a great significance was the Hollander or roll beater, also known as ‘grinding-trough’ or as ‘cylinder’, invented in the Zaanland windmills (in the province of Northern Holland) manufacturing coarser paper grades, and later adapted for watermills. In the opinion of Voorn, the edge-runner (‘Kollergang’) applied in those mills was a forerunner of the roll beater. The bedstone of the edge-runner has been developed into a bedplate of the beater, and the runners into the rolls covered with metal bars (‘knives’). According to Voorn, probably about the year 1650 the Hollander beater (in Dutch: ‘maalbak’), though still primitive, was working there. In 1673 the beater was improved by replacing the iron knives and bedplate by knives and plate of bronze. This made it possible to make white writing and printing papers, which was done in the Zaanland mills from that year onward.¹⁷

First drawings of such beaters (though incorrect) were published in 1718 in

¹⁷ Henk Voorn: *De papiermolens in de provincie Noord-Holland*. Haarlem 1960 (De Geschiedenis der Nederlandse papierindustrie, Vol. 1), pp. 39 (Fig. 18), 532.

Augsburg, in the book by L.Ch. Sturm dealing with mill machinery, after his researches in Dutch paper mills.¹⁸ The roll beaters were applied for the beating process of rag fibres to prepare the whole-stuff from them. Later, different roll beater with broader bars on the roll, named also ‘breaking cylinder’ (in Dutch: ‘roerbak’), was developed to prepare the half-stuff from pieces of the rags, with washing the rag fibres during that process. Both breaking and beating processes were progressed much more quickly in these roll engines, in comparison with an efficiency of the stampers applied to such processes; the detailed and highly interesting comparisons were presented by Balston.¹⁹ However, even after the introduction of the Hollander beaters there were mills in Germany and France, as well as in Italy, with the old stampers, especially the stampers for preparing the half-stuff, thus trying to assure long-fibred stock for making paper.²⁰

In papers manufactured by the Dutch mills the rag fibres were more shortened; however, the productivity of these mills was much higher thanks to more efficient applying the driving power of the windmill in the stock preparation process with those beaters increasing its output about eight times, in comparison with traditional stampers. Moreover, in the mills formerly equipped with only one vat soon the second vat was installed. It was usual; however, there were some mills worked three and even four vats. Early Dutch drawings of the Hollander beaters are shown in Fig.3.

¹⁸ Edo G. Loeber: Zu L.C. Sturm’s Papiermühlenrissen. In: *Papiergeschichte* 20 (1970), pp. 49-72.

¹⁹ John N. Balston: *The Elder James Whatman England’s Greatest Paper Maker (1702-1759)*. Vol. 1. West Farleigh/Kent 1992, pp. 215-241.

²⁰ Hunter (cf. note 9), pp. 167f.

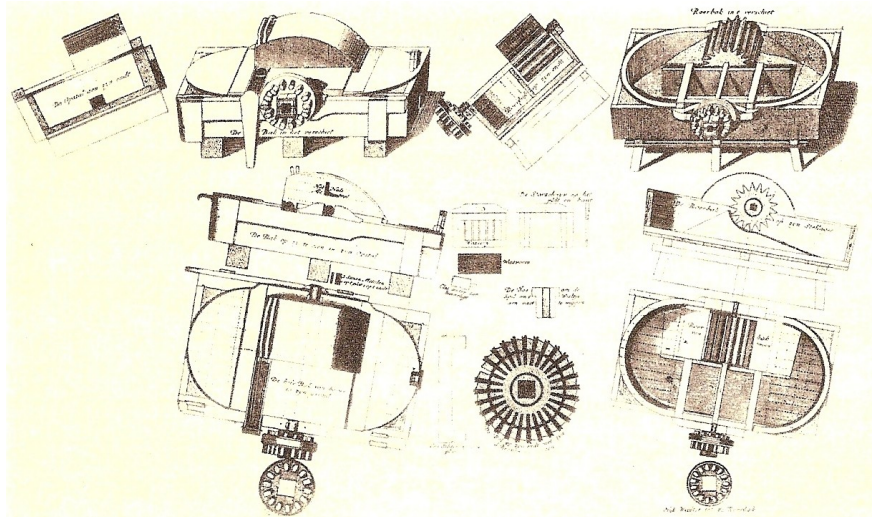


Fig.3: A collection of early Dutch drawings pertaining to Hollander beaters, from 1734; after Voorn (cf. note 17, p. 39).

Dutch papers from Zaanland, and also from Guelderland, were evenly formed and properly sized with the animal glue size; the use of fish-glue had no confirmation in archive-records. Moreover, two wooden glazing-rolls (in Dutch: ‘pleystermolen’) were applied for finishing paper with a smooth surface. Thanks to these technical innovations, the province of Northern Holland became so significant exporter of hand-made paper. There was a period of great boom from 1700 to 1800, when from 130 to 160 thousand reams of paper were manufactured each year in the province, with almost equal parts of white paper and wrapping (grey and blue) paper (also watermarked) in the output. At that time skilled papermakers of Zaanland were particularly prized abroad, getting very high wages; their emigration was forbidden at the beginning of the second half of the 18th century, and was then severely punished.²¹ Dutch merchants and entrepreneurs should be recalled, who established themselves in France, particularly in Angoulême, where many papermills were run on Dutch capital. French paper ordered by the Amsterdam factors and manufactured with special watermarks was sold in the Netherlands and exported abroad.²²

²¹ Voorn (cf. note 17), pp. 57, 75, 533f.

²² Ibid., pp. 539f. Gabriel Delâge: *L’Angoumois au temps des Marchands Flamands (17 siècle)*. Paris 1990. René Laroche: Les Laroche, papetiers charentais. In : *Fumées du Nil* 3 (1992), pp. 14f.

Another important contribution was done in England. In 1756/57 James Whatman replaced the original laid cover with a woven one, much denser than the laid cover. This was followed (before his death in 1759) by the development of an entirely new structure for the papermaking mould, enabling an efficient dewatering during moulding of the wove paper. Any wire marks (laid and chain lines) are not perceived in the wove paper held up to the light, and such a very smooth surface is peculiar to that paper. Early in 1777, Benjamin Franklin had drawn the attention of French papermakers (and printers too) to this new kind of paper.²³ A few years after that the manufacture of the wove paper started in France, under the name: ‘papier vélin’.²⁴ Nonetheless, this new kind of paper was propagated slowly. Later on, the woven wire was pressed (before fixing it to the mould-frame) for watermarking of paper with both simple and (later) more complicated light-and-shade watermarks. Such watermarks in paper still play a prominent part in the prevention of counterfeiting, and reasonably artistic results are gained in watermarked reproductions of the paintings of the old masters, as well as in portraits of celebrities.²⁵

The application of woven wire in forming the sheet of paper by Whatman in England was, however, a prelude to forming the web of the wove paper in the paper-making machine, invented in 1798/99 in France by Nicolas Louis Robert, and implemented to practice in England, where first such machine was erected in 1803, in the Frogmore paper mill. In these open wire machines the fibre suspension is deposited on top of an endless woven wire running horizontally. Forming the wove paper, i.e. without any wire marks in its look-through, was also possible in the cylinder-mould machine. John Dickinson patented, in 1809 in England, such machine with a strong, hollow cylinder covered with a woven wire cloth.²⁶ However, in such machines a laid wire could also be used for

²³ John Balston: *The Whatmans and Wove (Velin) Paper. Its Invention and Development in the West*. West Farleigh/ Kent 1998, pp. 1-81, 116f.

²⁴ Marie-Hélène Reynaud: *Une Histoire de Papier. Le Papeteries Canson et Montgolfier*. Annonay 1989, p. 32.

²⁵ Hunter (cf. note 9), pp. 295-308.

²⁶ Robert H. Clapperton: *The Paper-making Machine. Its Invention, Evolution and Development*. Oxford 1967, pp. 15-29, 65-73.

covering the forming cylinder, to produce the laid paper, i.e. with laid and chain lines in its look-through.

Loeber presented details of the paper moulds applied in Europe, as well as their laid and wove covers, perceived in historical context. In his opinion, the earliest attempts towards mechanical weaving of laid covers started at the end of the 17th century, and such problems were practically solved during the first half of the 18th century, either in England, or in Holland. Loeber mentions the two-sheets moulds upon which two normal sheets of paper were made simultaneously, end-to-end. These large moulds, presumably originated in Holland to increase an output, became quite popular in Holland and Great Britain in the 18th century.²⁷

There were many small improvements in making paper by hand propagated by those journeymen ('freemen' or 'companions') who travelled from place to place in their own country, and abroad too. German papermakers, who contributed much to the development of making paper by hand in central and eastern parts of Europe, introduced to their new home-lands also their terminology of papermaking and their customs. Some information was preserved from oblivion for the times after the Thirty Years' War (1618-48), when German papermaking was able to recover, and German papermakers started to gather in professional groups, developing a peculiar set of customs never set down in writing or print. Renker made a successful attempt to collect those customs of German papermakers, who settled their own affairs in conventions attended by representatives of both masters and companions. The latter had a very strong position in German papermaking as they could reprimand a master, and even the visiting companion had the right to do that. The reprimands, or 'Scheltensachen', were quite frequent, and no companion was allowed to work for the reprimanded master. Less severe consequences had

²⁷ Edo G. Loeber: Paper Mould and Mouldmaker. Amsterdam 1982, pp. 27-30, 37-40.

another procedure called ‘citing’ (Citieren); nonetheless, such citing could cost a master as much as 30 thalers. Renker stated: “An honourable master could easily be ruined by dishonourable companions, when the latter combined to speak against him”. In his opinion, the position of the craft was so strong that Niklaus Dürr, papermaker of Basel at the end of the 16th century, could say: “No emperor nor king, no prince, is able to resist the will of the German handcraft.” Not all German papermakers were friends of the old customs, and the authorities of Saxony advocated, in 1764, the abolition of the “customs”, but without success. In the opinion of Renker:

This decree of King Sigismund I of Poland, in 1546, may be said to be of German origin, because most papermakers referred to were Germans. In this regulation the social element is stressed for the first time. Contributions were levied for the care of the sick and the poor.²⁸

But not only this was new in the Latin document (*Confirmatio articulorum artificii papiracii*) approved by King Sigismund I the Old on 10 October 1546, at Kraków; quite recently published in English translation with notes and explanations.²⁹ In contrary to the German customs, the regulations of Polish papermaking point out the leading position of the owners of paper mills and masters of that craft. The role played by freemen (companions) was limited, and all were bound (under pain of loss of craft rights) to make known any evil report concerning a newly arrived freeman. According to the Polish regulations, the conflicts unsolved within a circle of papermakers should be placed before the jurisdiction of the local council, and its sentence was binding. In the 1546 regulations, the earliest known document in Europe that illuminates the nature of a papermakers’ statute, King Sigismund I the Old assigned to Polish papermakers as their emblem the figure of Saint Anthony bearing staff and bell, the tutelary guardian of the papermaking craft in many countries; in contrast with the custom started in Fabriano, where papermakers remained under the

²⁸ Armin Renker: Some Curious Customs of Old-Time Papermaking in Germany. In: *The Paper Maker* 30 (1961), No. 1, pp. 3-10.

²⁹ Dąbrowski/Simmons (cf. note 14).

protection of Saint Maria Magdalena. Radermecker gave a detailed account of papermakers' associations and of their saint patrons in the provinces of France, presenting also other guardians of papermakers besides these two mentioned above.³⁰ Rosenband carefully collected and thoroughly analysed many historical facts about activities of papermakers in papermaking centres, mainly of western European countries, documenting tough competition in many aspects of the papermaking craft.³¹

For such reasons no learned craftsman perceived any advantage in sharing his knowledge with others by publishing technical details of making paper by hand. The first real technical manual in this field was published by J.J.F. de Lalande: "Art de faire le Papier" (Paris 1761), who was asked to prepare such elaboration by famous Academie de Sciences in Paris. In 'Introduction' to the English version of that book, entitled 'The Art of Papermaking' and published more than two hundred years after the original French edition, Voorn mentions translations to other languages of the work by Lalande issued quickly in: German – 'Die Kunst Papier zu machen', in 1762; Italian – 'Osservazioni intorno all'arte di fabbricare la carta', 1762; Spanish – 'Arte de hacer el papel', 1778; Dutch – 'De Papiermaker', 1792.³² Translation into Polish was ready in 1799; however, it was published in 1817.³³ So high demand for paper in the second part of the 18th century resulted in still growing interest of entrepreneurs in many European countries to invest in papermaking, and therefore for the entrepreneurs the work by Lalande was such a very useful manual, rich in technical details of papermaking machinery and with some technological remarks. In many European countries number of active paper mills was still growing before the end of the 18th century and also at the beginning of the next

³⁰ Alphonse F. Radermecker: Les confréries et associations papetières en France sous l'ancien Régime. In: IPH Congress Book, Vol. 10 (1994), pp. 71-79.

³¹ Leonard N. Rosenband: Formazione ed evoluzione dei centri della produzione della carta. In: Cavaciocchi (cf. note 1), pp. 49-71.

³² The Art of Papermaking by Joseph de La Lande 1761, transl. by R. MacIntyre Atkinson. Kilmurry 1976.

³³ Michał Kado: Opisanie fabryki papieru [A description of the paper factory]. In: Dziennik Wileński 6 (1817), pp. 429-480.

century. It was documented in England, where first paper-making machine was introduced, in 1803, into practice; however, number of paper mills at work reached its peak in the 1820s, with prevailing number of the mills used for the manufacture of coarse (wrapping) paper and board.³⁴ Such tendency towards growing the number of mills at work used for the manufacture of paper by hand was displayed almost to the middle of the 19th century in eastern parts of Europe, where paper-making machines were slowly introduced into paper industry.

Some main alterations in paper technology introduced after initiating European papermaking in Italy should be mentioned. Wrapping papers were made from coarser rags; however, such papers were also sized with the gelatine size. Different kinds of wrapping papers, both grey and (later) coloured, also thicker grades and board, started successively to become manufactured. Quite early, the technology of making drawing paper, started to become separated from the technology applied in manufacturing writing paper, and later watercolour drawing paper and other papers for artists started to become produced, however, in rather small quantities.³⁵ Much more important alterations in the technology of white papers were introduced after Gutenberg's invention of the genuinely European art of printing; his 42-line Bible has been printed partly on parchment, but mostly on writing papers from Italy.³⁶ Gutenberg's invention resulted in a growing need for a much cheaper paper, manufactured not for writing but specifically for printing, with a softer, not so hard sized surface. In the 16th century the technology of making printing paper started to become separated from the technology used in manufacturing writing paper.

³⁴ Alfred H. Shorter: Paper Mills in England in the 1820s. In: *Papiergeschichte* 10 (1960), Nr. 3, pp. 32-35.

³⁵ Albert Elen: Italian Late-medieval and Renaissance Drawing Book: from Giovannino de Grassi to Palma Giovane. Leiden 1995. John Krill: Silk Paper for Crayon Drawing in the 18th Century. In: *IPH Congress Book*, Vol. 10 (1994), pp. 117-121. Peter Bower: Turner's Papers. London 1990. *Ibid.*: Turner's Later Papers. London 1999. Balston (cf. note 23), pp. 243-299.

³⁶ Paul Needham: The Paper Supply of the Gutenberg Bible. In: *Papers of the Bibliographical Society of America* 79 (1985), No. 3, pp. 303-374, here pp. 307-319.

This question is more thoroughly discussed in a recently published attempt to recapitulate the story of permanent and durable papers.³⁷ At the turn of the 15th century, alum, i.e. aluminium potassium sulphate, was introduced (outside Italy) into gelatine for paper sizing, and this resulted in such a completely acidic paper. Alum was added to the gelatine size as the preservation agent, and its moderate admixture controlled the viscosity of the size, and finally, alum hardened of the gelatine-sized papers. This means that the era of acidic paper had already begun in the time of making paper by hand. Nevertheless, gelatine has a marked protective role towards cellulose, also in the gelatine-sized papers with a moderate admixture of alum. However, pressure from printers, who demanded less tough and rather cheap papers, resulted in many simplifications while manufacturing the printing papers by hand. Used and even defected moulds became applied in the manufacture, also moulds without any watermarks. Rags of lower quality were more and more frequently used to produce printing paper, with a weak gelatine sizing, and later on even without any external paper sizing at all, as the so-called ‘waterleaf’ paper. After printing, these waterleaf papers were ‘evened’ (in German ‘planiert’) using a diluted solution of animal glue with alum admixture; next, the printed sheets were pressed, dried, and burnished. However, the gelatine content was too low both to strengthen such printing papers and to buffer their acidity. A steady decline in the quality of printing papers started before the end of the 17th century, and the general character of that trend was confirmed by the results of Barrow’s studies. These are presented in Fig.4, showing a dramatic decrease in the folding endurance of those printing papers, which were manufactured after c. 1670.

³⁷ Józef Dąbrowski: Aspects of Technology and Market Forces in the Story of Permanent and Durable Papers. In: IPH Congress Book, Vol. 15 (2004), pp. 107-124, here pp. 111-114. See also, Anna-Grethe Rischel: Adaptation and innovation in technology and quality- A study of 250 years of Danish and European rag paper. In: Ibid., pp. 105-115.

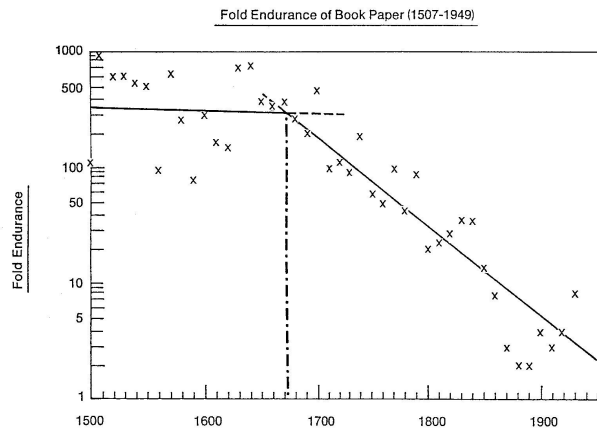


Fig.4: Folding endurance (MIT tester, 0.5 kilogram force of tension) of book papers manufactured from 1507 to 1949, studied by W.J. Barrow (cf. note 7, Appendix C: Figure 2).

Papermakers to the manufacture of writing papers paid much more attention than to manufacturing printing papers, as writing papers were costly and their manufacture was more profitable for their producers. The writing papers were better sized with the gelatine, to be fit for writing, and they were usually still watermarked.

Some features of writing and printing papers made by hand in Europe

A peculiarity of European hand-made papers, especially of such early papers made in accordance with the Fabriano technique, is their character of a kind of composite material made from two natural polymers: the cellulose (in its natural fibrous form of plant fibres) and the protein (extracted from hides and bones); created during the very manufacturing process of paper, not during its subsequent processing. Both polymers were responsible for the durability and permanence of such papers, and for their performance in practical applications, resulting in a very tough structure of such papers made in accordance with the Fabriano method, both in Italy and in other countries. This also gives a possibility to reproduce easily their watermark, another peculiarity of European hand-made papers. The pattern of paper surface may be copied by gentle rubbing a piece of thin white paper laid over the wire side of an old European hand-made paper (placed on a hard flat surface) with a soft and wedge-pointed

pencil. However, the method may be not successful regarding ‘younger’ papers made by hand later on in Europe, owing to the changes in paper technology shortly discussed above. An example of the result gained in the rubbing technique, so simple and objective, is shown in Fig. 5.³⁸



Fig. 5: An example of the result (reduced) gained in the rubbing technique applied to copy a pattern of the paper being one among other papers used for printing the book (about 1480) by Guilelmus Parisiensis, i.e. Johannes Herolt; according to Ziesche (cf. note 38).

The invention of watermarks made up by Fabrianese paper-masters started ‘the era of the sign in the history of paper’, as it was pointed out in the bi-lingual (Italian & English) book reproducing three essays by the Zonghi brothers, Aurelio and Augusto, early scholars involved in thorough investigations into the history of paper and watermarks in the Fabriano area.³⁹ In the first essay, originally published in 1881 at Fabriano, Aurelio Zonghi came to the conclusion after his studies on watermarks in the Fabriano archives:

If so careful comparisons are made between undated papers and dated ones, even approximately, we can –without fear of error – attribute the same date to papers which incidentally have no date and this is the practical result of the comparative study of the watermarks. Such study should, however, be accompanied by accurate observation of all the other features that establish the absolute similarity of the paper sheets compared.⁴⁰

In early papers the position of the watermark in the plane of the sheet was not fixed. In Fig.2, presented above, the watermark design is shown in the centre of the sheet; however, the watermark became later located in the centre of one half

³⁸ Eva Ziesche: Datierung von Strassburger Drucken mit Hilfe von Wasserzeichen. In: IPH Congress Book, Vol. 10 (1994), pp. 25-29; here p. 28, Abb.2.

³⁹ Giancarlo Castagnari (ed.): L’Era del Segno. The Era of the Sign, Vol. 1, L’Opera dei Fratelli Zonghi. L’Era del Segno nella Storia della Carta. The Zonghi Brother’s Work. The Era of the Sign in the History of Paper. Fabriano 2003, pp. 225f.

⁴⁰ Ibid., p. 271.

of the sheet with its vertical axis in the direction of the chain lines. Writing papers were usually used as ‘folio’, i.e. after folding in the middle of the narrow way, and in this case the watermark was perceived in the centre of one of the two halves. Later on, the counter watermark was added to another half of the sheet. Occasionally, the third mark was placed between the two main watermarks. International Association of Paper Historians (IPH) elaborated and published the international standard for the registration of papers with or without watermarks, together with the typological index, both in four languages: English, German, French, and Spanish.⁴¹

Traditional method of reproducing watermarks is tracing them with a pencil on translucent paper or foil. The foundations of the modern science of watermarks were established by Charles-Moïse Briquet in his four-volume work ‘Les Filigranes’, published in 1907, reprinted in 1923, and finally republished by the Paper Publications Society as ‘The New Briquet Jubilee Edition’ in 1968, fifty years since Briquet’s death. The last publication is a facsimile of the 1907 edition (in French) with supplementary materials (in English), edited by Stevenson and with Simmons as the general editor; containing Briquet’s complete text and plates in facsimile (with added use-dates), together with 150 pages of supplementary materials.⁴² The ‘Jubilee Edition’ was also an opportunity to select a bibliography of the literature of paper history and watermarks published since 1907, by Simmons. The Paper Publications Society deserves mention owing to the merits of the Society in publishing watermarks albums and other paper-historical studies. Emile J. Labarre founded the Society in June 1950, with Labarre as the general editor. After Labarre’s death, in 1965, Simmons became the Society’s general editor. He edited, translated, and adapted for publication in English the watermark album published (Moscow 1844) by

⁴¹ Peter F. Tschudin (ed.): International Standard for the Registration of Papers with or without Watermarks. Version 2.0 (1997). Basel (without date); Albert Elen (ed.): International Standard for the Registration of Papers with or without Watermarks. Version 2.0 (1997). Typological Index. Leiden (without date).

⁴² Allan Stevenson (ed.): The New Briquet Jubilee Edition. C.M. Briquet Les Filigranes. Dictionnaire historique des marques du papier dès leur apparition vers 1282 jusqu’en 1600. 4 Vol’s. Amsterdam 1968.

Tromonin, the first really substantial watermark album, as vol. XI of the ‘Monumenta Chartae Papyraceae Historiam Illustrantia’ (MCPHI), a main series edited by the Society.⁴³ However, some other publications such as ‘out of series’, ‘offprints’, ‘supplements’, etc. – were also published by the Society, altogether forty-six items. Volume XV edited in 1994, ‘Likhachev’s Watermarks’, crowned the ‘Monumenta’ series of the Society, who after that edition stopped further activities.⁴⁴

Watermark albums are documentary evidence of the very existence and activities of paper mills; however, they are also useful for characterising old manuscripts, documents, drawings, printed matters, etc. - extant on paper, and (sometimes) even to dating them. In such attempts, however, complications may occur. While discussing such questions, Voorn highlighted various lifetimes of a papermaker’s mould. Regarding watermarks in North-Holland, Voorn found a greater degree of uniformity between various moulds than was the case elsewhere, as independent craftsmen who had specialized in this type of work made the moulds there. In his remarks Voorn remembered also ‘twin moulds’ with the same watermark but with different details.⁴⁵

Hand-made papers were produced with applying a pair of mould-frames; see Fig.1 and Fig.2. In studies of watermarks this fact has been neglected for a long time. According to Schmidt, it was Karl T. Weiß, the German watermark expert, who as the first emphasized that phenomenon in his study published in 1915. Moreover, Weiß had been corresponding about this matter with Briquet, “and the latter admitted that he had missed this obvious point”.⁴⁶ However, it was Stevenson who brought to the attention of the scholarly world new uses of

⁴³ John S.G. Simmons (ed.): Tromonin’s Watermark Album. Hilversum 1965.

⁴⁴ John S.G. Simmons, Bé van Ginneken-van de Kastele (eds.): Likhachev’s Watermarks. An English-Language Version. 2 Vol’s. Amsterdam 1994.

⁴⁵ Voorn (cf. note 17), pp. 536ff.

⁴⁶ Frieder Schmidt: European Papermaking - its History and the Research into its Past. The Paper Road: From the Origins to the Future. International Paper Symposium’95. Tokyo 1995, pp. 18-36, here p. 30.

watermarks as bibliographical evidence⁴⁷, and his next study, entirely devoted to twin watermarks,⁴⁸ directed watermark studies towards new solutions. Kazmeier, in his 1952 publication⁴⁹, also presented twin watermarks; nonetheless, his study was limited only to paper stocks of the Gutenberg Bible, without viewing watermark studies from a new perspective, and in addition Kazmeier's study contained some errors, Needham discussed the latter.⁵⁰ Stevenson, in his careful analyses of former publications, found many observations very close to the concept of twin watermarks, starting from remarks by S.L. Sotheby in 1858, also by Briquet in 1907, and later by some others. Nevertheless, this concept was formerly not clearly and fully presented. Stevenson illustrated his theses with photographs of twin watermarks, presenting their examples both simple and more complicated.⁵¹ Needham has thoroughly discussed the new possibilities to bibliographers raised after Stevenson's studies, requiring the study of both the mould-frame covers and the watermarks attached to them. In his opinion, the typographical and paper evidences joined together are considerably stronger in book-science than either alone.⁵²

A more objective picture of watermark, together with laid lines and chain marks, may be received in applying modern methods for which most writing and printing inks are not an obstacle in creating clarity of the picture. A mildly radioactive sheet of plastic emitting electrons (beta-rays) is applied in beta-radiography has been the most popular method, although it is expensive and rather slow. The sheet of paper is placed between the radioactive plate and the film, and resulted sandwich is left to exposure, and its time is depending on the mass of materials penetrated by beta rays. The first beta-radiographs of all the

⁴⁷ Allan H. Stevenson: *New Uses of Watermarks As Bibliographical Evidence*. In: *Papers of the Bibliographical Society of the University of Virginia* [i.e., *Studies in Bibliography*] 1 (1948-1949), pp. 149- 182.

⁴⁸ *Ibid.*: *Watermarks Are Twins*. In: *Studies in Bibliography* 4 (1951-1952), pp. 57-91.

⁴⁹ August W. Kazmeier: *Wasserzeichen und Papier der zweiundvierzigzeiligen Bibel*. In: *Gutenberg Jahrbuch* (1952), pp. 21-29.

⁵⁰ Needham (cf. note 36), pp. 305f.

⁵¹ Stevenson (cf. note 48), pp. 90f.

⁵² Paul Needham: *The Study of Paper From the Archival Point of View*. In: *IPH Yearbook of Paper History*, Vol. 7 (1988), pp. 122-135.

watermarks of B42 paper stocks were published by Needham.⁵³ In a more elaborated and costly version of the process, called electron-radiography, an X-ray machine is applied as the primary energy source, bombarding a lead sheet which re-emits electrons (beta-rays) penetrating through the sheet of paper to the film. This method is very much faster than typical beta-radiography, there is possible to prepare almost 200 pictures a day.⁵⁴ Soft X-ray radiography is also faster than typical beta-radiography; however, rather expensive too because an X-ray machine is applied. Moreover, the picture is taken in a relatively small area in soft X-ray radiography. Comparative studies were recently published, in which four different methods were applied for visualisation of watermarks, together with laid and chain lines, in studied paper objects. Two copper engravings and one woodcut were studied with such methods as: beta-radiography, soft X-ray radiography, scanning in the transmission mode, and the Dylux method. The comparative studies showed that all these non-destructive methods gave the pictures with actual size of watermarks; however, paints and printing inks interfered with both scanning in the transmission mode and the Dylux method, whereas no interference occurred with both beta and soft X-ray radiography. The latter was much faster and yielded more details in the picture than beta-radiography.⁵⁵ Regarding the Dylux method, it was elaborated by Gravell who applied Dylux[®] photosensitive paper, developed by DuPont Corp., for preparing the picture of watermark.⁵⁶ The photosensitive paper is laid over the studied paper and exposed to light (410-500 nm). The light is transmitted through the studied paper to the photosensitive paper, and the latter is subsequently exposed to UV-radiation (200-400 nm) developing the picture of watermark with laid and chain lines on the photosensitive paper, without any

⁵³ Needham (cf. note 36), pp. 374-378.

⁵⁴ Dierk Schnitger, Eva Ziesche, Eberhard Mundry: Elektronenradiographie als Hilfsmittel für die Identifizierung schwer oder nicht erkennbarer Wasserzeichen. In: Gutenberg Jahrbuch (1983), pp. 49-67.

⁵⁵ Manfred Schreiner, Helmgard Wallner-Holle: Determination of Watermarks by Non-destructive Methods. Comparative Studies. In: Rosella Graziaplina, Mark Livesey (eds.): Paper as a Medium of Cultural Heritage. Archaeology and Conservation. 26th IPH Congress. Roma 2004, pp. 142 – 152.

⁵⁶ Thomas Gravell: The Need for Detailed Watermark. In: Restaurator 4 (1980), pp. 221-226.

additional treatment of the photosensitive paper. So the Dylux method is a dry process, in contrast with wet processing methods, like all the radiography methods (beta-, electron-, and soft X-ray radiography), in which the wet development of the picture on the film is required.

In books the position of watermark in a leaf depends on the system of folding of paper sheets: folio, quarto, etc. After binding of the book some fragments of watermark are not available. Nonetheless, the very structure of the laid cover of the papermaking mould-frame impressed in the wire side of paper is also of great significance in characterising the sheet of paper and its origin. To that end the measurements with a high precision of the distances between chain lines in the sheet of paper may give useful information.⁵⁷ Bogdanov elaborated an efficient system of the so-called interval tables.⁵⁸ Nevertheless, the computer aided image analysis offers the best solution of such questions, and the system of large-scale laid lines density measurements, with the AD751 computer program specially written to that purpose by Atanasiu and Multimedia Press (for the Istituto Centrale per la Patologia del Libro at Rome) proved practically its efficiency in characterising and identifying the sheet of paper.⁵⁹ Additional information about the image processing can be found in a website of the Bernstein Consortium,⁶⁰ together with addresses of some databases which present scanned images or tracings of watermarks. Among them there is the 'Piccard-Online' database, the world's largest collection already on-line, about 95,000 tracings of watermarks gathered by the late Gerhard Piccard, a German expert in watermark studies. It does mean that also tracings of watermarks are

⁵⁷ Öie Utter, Leo Utter: Schöpföormenbau und die alten europäischen Längenmaßsysteme. In: IPH Congress Book, Vol. 11 (1996), pp. 76-80. Leo Utter, Öie Utter: Grundbegriffe für Filigranologie. Wasserzeichenkunde und Mathematik. Tartu 2006.

⁵⁸ Andrey P. Bogdanov: Osnovy filigranovyedenya: istoriya, teoriya, praktika [Bases of Watermark Study: History, Theory, Practice]. Moskwa 1999, pp. 110-124.

⁵⁹ Vlad Atanasiu: Assessing Paper Origin and Quality by Means of Large-Scale Laid Lines Density Measurements. In: Rosella Graziaplana, Mark Livesey (eds.): Paper as a Medium of Cultural Heritage. Archaeology and Conservation. 26th IPH Congress. Roma 2004, pp. 172-183.

⁶⁰ The Bernstein Workspace (<http://www.bernstein.oeaw.ac.at/>)

still useful, and therefore such reproductions of watermarks, not only their scanned images, are still collected and later presented, also in the book form.⁶¹

Some aspects of paper-history in the discussed region of Europe

The art of papermaking was introduced into Central and Eastern Europe after Gutenberg's invention, and so printing presses were usually established there before the establishment of making paper by hand. At the beginning of the propagation of paper in Europe, both writing on paper and (later) its local manufacture were introduced from the south to the north and from the west to the east. It is therefore no surprise that the earliest known document written upon paper in this part of Europe is the document drawn up in the Kingdom of Hungary, which since 1310 was ruled by the Angevins of Naples (House of Anjou). Cardinal Gentilis used a sheet of Italian paper for that document, dated 12 May 1310 in Pozsony or Preßburg (since 1918 as Bratislava), in the Kingdom of Hungary.⁶² In another publication, the same historical event is mentioned, albeit without any historical context, as the evidence of the earliest usage of paper in Slovakia for writing a document.⁶³ In fact, it is the same information as above, only placed into today's Slovakia. This demonstrates that the same facts of paper history may be described in different ways by different authors, and the various names used in different languages for the same locations of papermills should be taken into account, together with changes of frontiers and creating new states.

Regarding the names of the places where papermills were operated, such names have sometimes even been used after 1945, even when they have ceased to reflect the historical reality of the situation. For example, East Prussian

⁶¹ José Louis Basanta Campos (Coordinador): *Marcas de aqua en documentos de los archivos de Galicia. T. VII and VIII: Siglo XIX*. Conde de Fenosa 2002. Valeriya A. Esipova: *Filigrani na bumagie sibirskikh dokumentow XVII-XVIII viekow* [Watermarks in paper of Siberian documents of the 17-18th c.]. Tomsk 2005. Tracings are supplemented with the scanned images of watermarks.

⁶² István Bogdán: *A magyarországi papíripar története (1530-1900)* [History of papermaking in Hungary (1530-1900)]. Budapest 1963, p. 19.

⁶³ Viliam Decker: *Dejiny ručnej výroby papiera na Slovensku* [History of hand papermaking in Slovakia]. Martin 1982, p. 11.

papermaking was described by Kohtz in his dissertation defended in the Albertus-Universität at Königsberg, and later published in Stallupönen.⁶⁴ However, those historical German names, like German names of the locations of those East Prussian papermills, have not been in use after 1945, and in addition, other historical names in Polish or Lithuanian languages of such places are also not used in their greater part. Also in other parts of the region discussed various names of papermills are present in paper-historical studies. For this reason, in this presentation of hand papermaking in the region discussed, these various names that are present in paper-historical publications will be recalled to denote papermills and/or their locations, trying to present the name used by the quoted author as first one. However, the reader is also informed about current names of discussed places. Nonetheless, English versions of some names will not be presented here as not used in paper-historical studies in the discussed region. Keeping in mind the limitations of this presentation, only certain papermaking centres and/or some of the longer-active papermills of that region will be discussed as examples of making paper by hand in various parts of the discussed region.

From the very beginning of paper propagation, both east central and east southern parts of Europe were supplied with paper from Italy. Later on, French, German, and Dutch papers were also in use in northern parts of the region discussed, however, paper from Germany and Austria was also used in its central parts. Nevertheless, paper was also exported from some parts of the region discussed during periods of highly-developed paper productivity. The latter fact will also be discussed below.

It should be remembered that after the destruction carried out by the Mongols at Poland and Hungary in the thirteenth century, the existing process of migration and colonisation by German settlers was officially accelerated. German law governed the rebuilt cities, which accepted a growing population of

⁶⁴ Hans Kohtz: Ostpreußische Papierfabrikation. Stallupönen 1935.

German burghers and merchants. Such conditions were also favourable for the activities of German craftsmen, and therefore German papermakers played a leading role in the papermaking of the region discussed. However, papermakers from Poland are also sometimes mentioned in sources as contributors to the development of making paper by hand in some places. In general, the technique of making paper by hand in the region discussed was a continuation of the technique developed in Italy with its further modifications and improvements.

Making paper by hand in the northern part of Central and Eastern Europe

Starting from the north, three longer active paper mills in Estonia should be presented. In the mill established in Härjapea, mentioned also as Tallinn (formerly also known as Reval), paper was made by hand within the years 1662-67 and 1677-1710. In the Sulu paper mill (the Haimre manor) paper was manufactured from 1717 to 1795. The Röpina paper mill, where machine-made paper was started in 1865, is still active. Making paper by hand in this mill, mentioned also as Röp-pin, started in 1734(36).⁶⁵

Under the influence of Poland, interest in papermaking rose in Livonia, according to the privilege given in 1583 by Stephen Bathory, the King of Poland. However, the first documented papermill in Latvia was established in the second half of the 17th century at Tome (Thomsdorf), in the Polish fief of Courland, thanks to the activities of Herzog Jakob. The first known watermark from this mill is seen in the paper of a 1664 document: T C (Thomsdorf Courland). Among three mills in the close vicinity of the town of Riga, established in the second part of the eighteenth century, only the mill in Zaslauka (Sassenhof) was active for any period of time, between the years 1765-1806; writing paper of good quality was also manufactured there, and its

⁶⁵ Jean Lehtaru: Estonia. In: <http://conservation.evtek.fi/history>. Leo Utter, Öie Utter: Wasserzeichen aus Röp-pinschen Papiermühlen. In: *International Paper History* 2 (1992), no. 2, pp. 30f.

watermark is presented in Fig.6.⁶⁶ In general, the master papermakers active in this area were mainly German, but Swedes were also present.⁶⁷

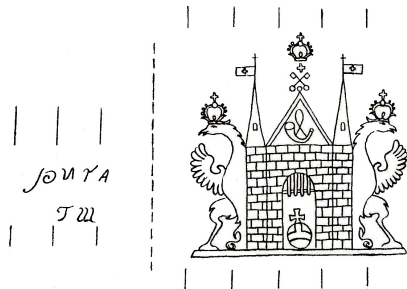


Fig.6: Watermark (reduced) dated 1768 of the papermill in Zaslauka (Sassenhof), after Jenss (cf. note 66, Abb.4).

In accordance with the will of the last Grand Master, Albrecht von Hohenzollern, as expressed at the end of 1523, first papermill and printing office in East Prussia were established at Königsberg. The papermill was active from 1524 (or 1525) to 1596; however, early papers were probably manufactured there without any watermark.⁶⁸ After the secularisation of the Teutonic Order and the adoption of the Lutheran faith, the new coat of arms, depicting a black eagle with a crown on its neck and the letter S on its breast, was given on 10 April 1525 in Kraków by Sigismund I the Old, to the province which henceforth was called Ducal Prussia. Albrecht von Hohenzollern, a nephew of Sigismund I the Old, became a hereditary duke owing fealty to the King of Poland.⁶⁹ This coat of arms with the letter S, the first letter of Sigismund I the Old, King of Poland and Duke of Prussia, became a motif of watermarks applied in East Prussian papermills. One such early watermark of the mill at Königsberg (in Polish Królewiec, in Lithuanian Karaliaučius, now in Russian Kaliningrad) is reproduced in Fig.7.⁷⁰

⁶⁶ Geo A. Jenss: Historische Quellen über die Herstellung und den Verkauf von Papier in Riga am Ende des 18, und Anfang des 19, Jahrhunderts. In: IPH Yearbook of Paper History, Vol. 2 (1981), pp. 335-352, Abb. 4.

⁶⁷ Ibid.: Die Beteiligung ausländischer Papiermeister und Gesellen am Aufbau und Betrieb der Papierindustrie Lettlands. In: IPH Yearbook of Paper History, Vol. 2 (1981), pp. 329-333.

⁶⁸ Kohtz, (cf. note 64), pp. 39-43.

⁶⁹ Stefan K. Kuczyński: Polskie herby ziemskie [Polish territorial arms]. Warszawa 1993, pp. 206-209.

⁷⁰ Włodzimierz Budka: Herby Prus Królewskich i Prus Książęcych jako znaki wodne [Arms of Royal Prussia and Ducal Prussia as watermarks]. In: Przegląd Biblioteczny 11 (1937), pp. 289-292, Fig. 1.



Fig.7: Watermark (reduced) depicting the coat of arms of Ducal Prussia, found by Budka in a manuscript of 1533 (cf. note 70, Fig. 1).

This ‘Adler’ watermark was later modified in many variants, especially after the sovereignty of Ducal Prussia was recognised in 1657, and after the Kingdom in Prussia was proclaimed in 1700.⁷¹ Other typical motifs seen in the watermarks of those papermills were called in German: ‘Marienbild’, ‘Karpen’ (i.e. Karpfen), and ‘Nelken’.

Making paper by hand was further developed in East Prussia during the seventeenth and eighteenth centuries, with larger and longer-active mills in Marienwerder, Trutenau, and Kiauten. Regarding the town of Marienwerder (now Kwidzyn), papermills were active in its vicinity, for example, at Bogusch (Boguszc) within the years 1586-1619, and at Semler (now Dankowo, within the boundaries of Kwidzyn) from about 1590 to about 1850.⁷² Niclas Fehler was the first papermaker in the latter mill and his watermark of 1593, with his initials NF, is shown in Fig. 8.⁷³



Fig.8: Watermark (reduced) of the Semler papermill (now Dankowo, within the boundaries of Kwidzyn), depicting a simplified version of the coat of arms of Ducal Prussia, with the initials of Niclas Fehler, found by Kohtz in a document of 1593 (cf. note 71, WZ. 6).

⁷¹ Hans Kohtz: Ostpreußische Adler-Wasserzeichen im Wandel der Zeit. In: Papiergeschichte 1 (1951), Nr. 1, pp. 47-53.

⁷² Roemer, (cf. note 12), pp. 155-163.

⁷³ Kohtz, (cf. note 71), p. 50, WZ 6.

North of Königsberg, at Trutenau (now Medwedewka, in the Kaliningrad region), a town owned by the Radziwiłł (Radvila) family of the Lithuanian aristocracy, a fulling mill (Walkmühle) was converted (1666) by Christoph Heindrich into a papermill. Later the mill was enlarged, and in 1798/99 about 4000 reams of paper were manufactured there, together with some quantities of board and of high quality pressboard. In 1855 a paper-making machine was installed in this mill.⁷⁴ The value of paper products manufactured in 1800 at Trutenau amounted to 8440 Rhein thalers.

A little bit higher value (9000 Rhein thalers) had at that time the hand-made paper products manufactured in Kiauten (now Smirnowo, in the Kaliningrad region, near the frontier with Poland).⁷⁵ The Kiauten mill, the first papermill in ‘Lithauischen Departement’, was built by ‘Papiermachergesell’ Ludwig Zieser (1734), and in 1843 a paper machine was installed there. It was also a large mill in which about 4000 reams of various kinds of paper were manufactured per year, according to the reports from the years 1744-1756.⁷⁶

There was acute shortage of rags and raw materials for making animal glue for papermaking at that time. Jan Jakub Kanter published in Kwidzyn a renewed and tightened-up edict (issued on 16 October 1777 at Berlin) before the end of 1777 in a bi-lingual version, German and Polish (see Fig.9).⁷⁷

⁷⁴ Ibid., (cf. note 64), pp. 66-81.

⁷⁵ Ibid., p. 142.

⁷⁶ Ibid., pp. 99-103.

⁷⁷ Dąbrowski/Siniarska-Czaplicka, (cf. note 13), pp. 176f, Fig. 45.

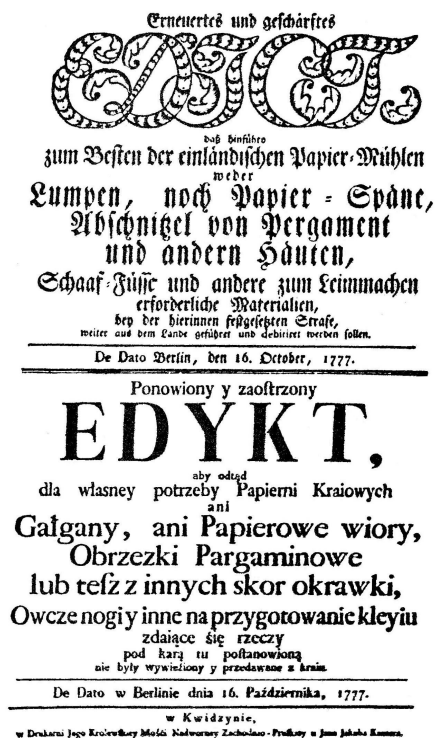


Fig.9: The edict prohibiting the export of rags and other raw materials for making paper, issued on 16 October 1777 at Berlin, and later published at Kwidzyn in a bi-lingual German & Polish version, according to Dąbrowski and Siniarska-Czaplicka (cf. note 13, p. 176, Fig.45).

Michael Kongehl, a poet of German baroque, should be recalled here, as the author of this short piece of poetry entitled *Auff eine Papier-Mühle*, (published with his other verses in 1683 at Königsberg), quoted here after Kohtz:⁷⁸

*Wir machen die Sachen die nimmer vergehn
aus Tücher die Bücher die immer bestehen;
Wir schikken zu drücken den Druckern von hier
die geben das Leben dem todten Papier;
dort stampffen die Stampffen die Hadern und Lumpen
dort strudeln und wudeln die plumpenden Pumpen;
dort presset, dort lasset man leimen Papier;
dort schälet und zählet und giebt mans herfür.*

In the second half of the eighteenth century, nineteen papermills were operated in East Prussia. After 1945 the places where these mills had been run became

⁷⁸ Hans Kohtz: Der Herkunft ostpreussischer Papiermacher. In: *Papiergeschichte* 4 (1954), Nr. 1, pp. 8f. His Note Nr. 8: „Alle hier erwähnten Gedichte von Michael Kongehl stehen in seinem Buche: *Der Belustigung bey der Unlust*; Königsberg, 1683.“

situated mainly in the Kaliningrad region of Russia and in Poland, and one place is in Lithuania, i.e., Wischwill (in Lithuanian Viešvilė). Only the buildings of the Grünheide papermill have partly survived the stormy history of this area; see Fig.10. Currently the mill produces electric energy and is something of a serious obstacle to tourists travelling by canoe on the picturesque route of the Krutynia River (below the village of Krutyń), in the place now called in Poland Zielony Lasek. The mill was established in 1765 at an unspecified area near Rataywolla, which was initially called ‘Papiermühle’, and later became known as Grünheide.⁷⁹



Fig.10: Buildings of the Grünheide mill, in the place which since 1945 has been called Zielony Lasek; photograph taken by the author in 2005.

Among these nineteen papermills there were two Polish mills in Ermland (Warmia, in Polish), annexed in 1772 by the Kingdom of Prussia during the First Partition of the Polish-Lithuanian state. Kohtz described these two mills situated in Wadang (now Wadąg) and Wusen (formerly Woźno, now Osetnik), recalling their former attachment to Poland.⁸⁰ Trunz added new details to the history of these mills. In Wusen, paper manufacture started about 1700, according to the first known watermark of this mill dated 1703, with the initials

⁷⁹ Kohtz, (cf. note 64), pp. 110f.

⁸⁰ Ibid., pp. 115-121.

of papermaker: CGB, still indecipherable. First known papermaker in this mill is Joseph Hempel the elder (the son of Johann Andreas Hempel), who ran this mill from 1735 to c. 1760. In 1860 the Wusen papermill was converted to a corn mill.⁸¹ In Wadang, a papermill was built in 1715 by Johan Andreas Hempel, who ran this mill until his death (1733). The mill was stopped in 1866.⁸² Additional information about these mills and their papermakers was published by Hempel, the eighth descendant (in Polish line) of Jan Andrzej Hempel. In historical sources this surname is also written as Hempell or Hampel, and, according to the tradition of this catholic family, its ancestors left Scotland for Poland to find religious toleration in their new homeland.⁸³

While mentioning Ermland papermaking, Kohtz wrote some general remarks about the links between hand papermaking in East Prussia and in Poland, such as:

Der Lumpenhandel hin und herüber war bis auf die kurze Unterbrechung von 1747 bis 53 vom Könige von Preußen und dem Bischof von Ermland freigegeben. Preußisches Papier wurde nach Polen und polnisches, besonders Danziger, nach Preußen gehandelt, und die Papiermacher arbeiteten in Ermland in gleicher Weise wie auf preußischen Mühlen. Dieser wechselseitige Verkehr bezog sich nicht nur auf Ermland, sondern auf Polen überhaupt, zum mindesten auch auf die benachbarten Gebiete des späteren West- und Neuostpreußen. Auch polnische Magnaten bemühten sich zur Zeit des Merkantilismus, auf ihren Besitzungen Manufakturen zu errichten, und zogen dazu deutsche Handwerker ins Land.⁸⁴

During the eighteenth century, especially in its second half, and also in the first half of the nineteenth century, hand-made papers from East Prussian mills were sold to neighbouring countries, frequently to Lithuania. The largest published collection of Prussian watermarks, which have still not been fully deciphered, is available in a highly interesting album elaborated by Laucevičius, with tracings

⁸¹ Hansheinrich Trunz: Die ermländischen Papiermühlen Wusen und Wadang. In: Zeitschrift für die Geschichte und Altertumskunde Ermlands 38 (1976), Heft 99, pp. 53-79 (plus 66 watermarks, mainly 1:1), here pp. 62-65.

⁸² Ibid., pp. 65-71.

⁸³ Kazimierz Hempel: 160 lat warmińskiego papiernictwa [160 years of Warmia papermaking]. In: Przegląd Papierniczy 38 (1982), pp. 193-198.

⁸⁴ Kohtz, (cf. note 64), p. 128f.

of watermarks, both domestic and foreign, present in the paper of documents gathered in Lithuanian archives.⁸⁵

Hand papermaking was initiated in Lithuania at the same time as in East Prussia. The first paper mill was established in 1524 at Vilnius (Wilno), according to the privilege given by Sigismund I the Old (Žygimantas Senasis), who was the Grand Duke of Lithuania. In the opinion of Laucevičius (which is not commonly accepted), two papermills were built in 1524 in Vilnius; one was run by San Vernart and the second by Karulus Vernart, two brothers from Switzerland. The first mill was active until 1610, and the second one to 1741.⁸⁶ The watermark of the first mill is shown in Fig.11, depicting the coat of arms of Leo Sapieha (Leonas Sapiega), the Chancellor of Lithuania.⁸⁷

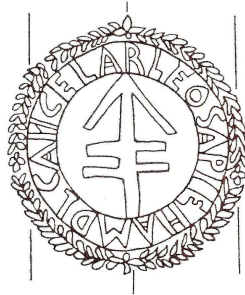


Fig.11: Watermark (reduced) of the Vilnius (Wilno) papermill, depicting the coat of arms of Leo Sapieha, the Chancellor of the Grand Duchy of Lithuania, found by Laucevičius (cf. note 85) in a document of 1598.

Vilnius, the capital city, was the main centre of Lithuanian hand papermaking, and about 11 papermills were built in its immediate vicinity before 1800. Their activities were interrupted for some periods, and the history of a few of them is not well-known. Also, the town of Kaunas (Kowno) should be mentioned as a papermaking centre; the first papermill was built there on municipal land by Georg Reiner in 1578. The same papermaker built a new and much larger papermill in Kaunas about 1590. The third papermill at Kaunas, owned by the

⁸⁵ Edmundas Laucevičius: *Popierius Lietuvoje XV–XVIII a.* [Paper in Lithuania in XV-XVIII c.]. 2 Vol's. Vilnius 1967. One volume with text, another volume (Atlasas) with tracings of 4276 watermarks.

⁸⁶ *Ibid.*, pp. 57f, 277.

⁸⁷ *Ibid.*, Atlasas, watermark no.1867.

town, also started work about 1590; however, its subsequent history remains obscure. By 1780 there was no longer any active papermill in the town.⁸⁸ In Fig.12 watermark of the second papermill in Kaunas is shown.⁸⁹



Fig.12: Watermark (reduced) of the Kaunas (Kowno) papermill, depicting the coat of arms of Lithuania, found by Laucevičius in a document of 1595.

Paper mills established in other parts of Lithuania by landlords, both noble families and reach burghers, were usually leased to master papermakers. Similar conditions obtained in Belarus, which was united with Lithuania in the Grand Duchy of Lithuania; the first papermill was built there about 1590, on the property of the mighty Zenowicz (Zenavičius) family at Smurgainiai (now Smarhon, also known as Smorgonie); however, the mill was not active after 1629.⁹⁰ A longer-active papermill was established in 1607 by Chancellor Leo Sapieha in his residence at Rožana (now Ružany, also known as Różana), where paper was manufactured until 1747.⁹¹ About 1690 the papermill was built at Lyskava (Łyskawa) estate owned by Samuel D. Bychowiec (Samuelis D. Bichovcas) and his wife Kristina of the Polish line of the Dönhoff family. The mill was active until the 1760s.⁹² In the watermark of this mill (see Fig.13), the coats of arms of both spouses are depicted.⁹³

⁸⁸ Ibid., pp. 73-76, 279.

⁸⁹ Ibid., Atlasas, watermark no. 3489

⁹⁰ Ibid., pp. 90, 281.

⁹¹ Ibid., pp. 90f, 281.

⁹² Ibid., pp. 102f, 283.

⁹³ Ibid., Atlasas, watermark no. 1063

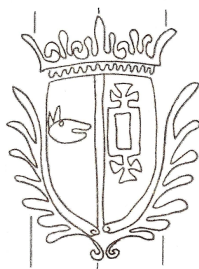


Fig.13: Watermark (reduced) of the Lyskava (Łyskawa) papermill, with the coats of arms of its owners, found by Laucevičius in a document of 1695.

Coats of arms were leading motifs of watermarks in hand-made papers in the Grand Duchy of Lithuania. However, the Horodło Agreement (1413) gave the nobles of the Grand Duchy of Lithuania similar rights to their peers in Poland, and fifty noble families were adopted into the coats of arms of Polish noble families; therefore such coats of arms and their alterations depicted in watermarks applied by the papermills of the Grand Duchy of Lithuania could not be considered as Polish. The Union of Lublin (1569) united the Grand Duchy of Lithuania and the Kingdom of Poland into the ‘Commonwealth’ (*Rzeczpospolita*) in which Podlasie and the palatinates of Ukraine (Volhynia, Braclav, and Kyjiv) were joined to Poland.

In the sixteenth century, paper was imported to the Grand Duchy of Lithuania also from Poland; however, later Lithuanian paper was sent to Russia, and could occasionally be found in Poland. Quite recently, paper from the municipal papermill of Vilnius, located in Paplauja (Popławy), a suburb of Vilnius, was found in Finnish archives, dated from 1616 to 1649.⁹⁴ The wars in the middle of the seventeenth century caused an economic collapse in the Grand Duchy of Lithuania, but its papermaking was partly reactivated later on.

Probably Italian craftsmen introduced papermaking to Poland. Three Italians, brothers Bonacursi (Bernard and Jakub) of Florence and Laurence of Lucca, who in 1394 settled in the town of Kazimierz (now within the boundaries of Kraków), started manufacturing felted woven woollen cloth using the Italian

⁹⁴ Lindberg, (cf. note 3), watermark nos. from 565 to 569, p. A 189.

technique. In 1396 they delivered their cloth to Jan of Zarnowiec, to the amount of 20 marks, as well as paper to the amount of 15 marks; one mark equalled about 200 grams of silver. It was not difficult to adapt a part of the fulling mill to making paper. However, any further documents about their activities remain unknown, and in the opinion of Ptaśnik, it may be that those Italian cloth makers made an attempt to manufacture paper near Kraków at the turn of the fourteenth century, but their work proved unprofitable owing to the relatively limited demand for paper, as well the fact of strong competition from foreign mills.⁹⁵

The first Polish papermill with its activity documented both in the sources and by surviving paper samples was established in 1491 at Prądnik Czerwony, now within the boundaries of Kraków. Fryderyk Szyling, a rich merchant and councillor of Kraków, founded this mill on the land leased by the monastery of the Holy Spirit de Saxia, and Mathias (Matys) Koch of Reutlingen started making paper there.⁹⁶ This mill, like many others in Poland, did not survive the so called ‘Swedish deluge’ (1655-60). The leading motif of its watermarks was the double-barred cross, i.e. the emblem of the Holy Spirit de Saxia, the order introduced to Poland in 1220 from France. However, watermarks depicting a bull’s head were also applied in the initial period of its activity. Jan Haller, who in 1503 established a press run by skilled printers in Kraków, acquired the rights to this mill in 1510, and his printer’s mark was used during the years 1511-32 at Prądnik Czerwony as a watermark, either alone or as an element at the top of the bull’s head (see Fig.14).⁹⁷

⁹⁵ Jan Ptaśnik: *Cracovia Impressorum XV et XVI Saeculorum. Monumenta Poloniae Typographica*. Vol. 1. Lwów 1922, p. 113.

⁹⁶ Kazimierz Piekarski: *Memoriał o początku i sukcesji papierni prądnickiej* [Memorial on the origin and the later history of the Prądnik papermill]. Kraków 1926, pp. 27-30.

⁹⁷ Dąbrowski/Siniarska-Czaplicka, (cf. note 13), pp. 104, 329.

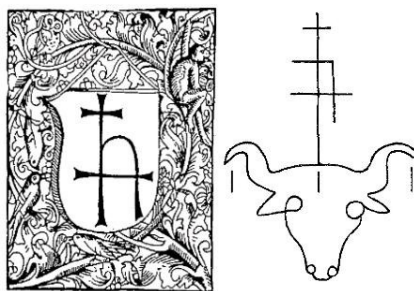


Fig.14: The printer's mark of Jan Haller (of 1506) together with his watermark of 1526 (both reduced), according to Dąbrowski and Siniarska-Czaplicka (cf. note 13).

At least at the very beginning of the sixteenth century (an exact date remains unknown), another paper mill was built by Bernard (Werner) Jeckel (Jocklin), a Swiss papermaker, on land owned by the Cistercian monastery in Mogiła (Clara Tumba), now within the boundaries of Kraków. The example of an early watermark of this mill (see Fig.15) depicts the crosier over the bull's head.⁹⁸

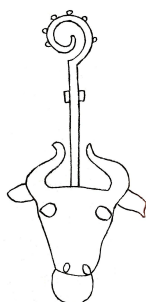


Fig.15: Watermark (reduced) of the Mogiła (Clara Tumba) paper mill found by Budka (cf. note 98) in a document of 1504.

In the Kraków area, which at that time was the main papermaking centre in Poland, thirteen papermills were founded before the end of the sixteenth century (see Fig.16).⁹⁹ However, 21 papermills were active at that time in the Kraków Palatinate; 6 of those mills have not been localised yet, but papers with their watermarks have survived.

⁹⁸ Włodzimierz Budka: *Papiernie w Polsce XVI wieku*. Prace F. Piekosińskiego, J. Ptaśnika i K. Piekarskiego powtórnie wydał i uzupełnił W. Budka [Sixteenth-century papermills in Poland. Works by Piekosiński, Ptaśnik, and Piekarski re-edited with additional material by Budka]. Wrocław 1971, watermark no. 38.

⁹⁹ Dąbrowski/Siniarska-Czaplicka, (cf. note 13), p. 254, Fig. 2.

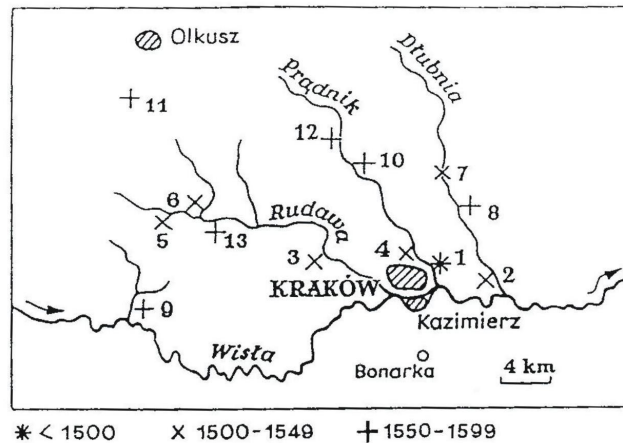


Fig.16: Documented sixteenth-century papermills situated in the Kraków area, according to Dąbrowski and Siniarska-Czaplicka (cf. note 13).

1). Prądnik Czerwony (Prądnik Wielki, Prądnik Duchacki, Rauchmühl), now in Kraków, from 1491 to about the middle of the 17th c.; *2).* Mogiła (Clara Tumba), now in Kraków, from at least at the very beginning of the 16th c. to the second half of the 17th c.; *3).* Balice, from 1518-21 to 1627; *4).* Prądnik Biały (Prądnik Mały, Prądnik Biskupi, Żabi Młyn, i.e. Froggy Mill), now in Kraków, from before 1531 to the mid-17th c.; *5).* Tenczynek, from 1536-37 to the second half of the 17th c.; *6).* Krzeszowice, from 1536-37 to the middle of the 19th c. (changing locations in Krzeszowice); *7).* Wilczkowice, from before 1549 to the 1770s; *8).* Młodziejowice, from before 1553 to the mid-17th c.; *9).* Okleśna, from before 1557 to 1816; *10).* Grembienice, from about 1560 almost to the end of the 17th c.; *11).* Starczynów (Żurada), the municipal papermill of Olkusz, from 1568 to 1620-50; *12).* Czajowice, from before 1581 (with interruptions) to the 1820s (at that time as Prądnik Czajowski); *13).* Podchelmie (now Kochanów), from about 1585 to 1632-48

Not so far from Kraków, three papermills were established in the sixteenth century. Before 1572 (perhaps in 1560) a papermill was built in Siedlec (later Sielec), now within the boundaries of Sosnowiec. In this mill, owned by the Minor family, paper was watermarked with their coat of arms depicting the donkey's head. In Poczesna, a papermill was founded shortly after 1583. In Mniszek paper manufacture was started before 1575, in the mill established by the Cistercian monastery. The coats of arms of subsequent abbots were motifs of the watermarks applied by the latter mill.¹⁰⁰

Hand papermaking in the Kraków area, although initiated by foreigners, was later reinforced by local craftsmen; however, in the opinion of Piekosiński, an early student of watermarks and a Professor of the Jagiellonian University, not all Kraków papermakers bearing German names could be recognised as

¹⁰⁰ Dąbrowski/Siniarska-Czaplicka, (cf. note 13), pp. 260f.

foreigners because at that time a major part of burghers in Kraków used German surnames; as stated in his 1893 album with 795 tracings of watermarks.¹⁰¹ Nevertheless, German papermakers from abroad who settled in Poland made an outstanding contribution to the development of papermaking in Poland and to Polish culture. The same can be said about the early printers of German origin. Curiously enough, in Kraków the early printers of German origin refused to print in German.¹⁰² The situation was different in northern parts of Poland, which had a denser German population.

In 1896 Piekosiński published his second watermark album; however, it contained only the bull's head watermarks shown in 324 tracings.¹⁰³ The fate of other parts of his rich collection of early watermarks remains unknown. Piekosiński traced the early watermarks seen in paper of the manuscripts extant in domestic libraries and archives; however, some of the watermarks of the fourteenth century, published by Piekosiński, had been traced by W. Frenzl, a custodian in the Municipal Library of the town of Breslau (Wrocław), and the tracings were presented to F. Piekosiński by Dr Markgraf, a head of the Library. Both these publications by Piekosiński documented mostly Italian papers.

The senior Kraków papermakers were probably responsible for preparing the regulations for the papermaking craft approved (1546) in the Latin document *Confirmatio articulorum artificii papiracii*, by Sigismund I the Old, King of Poland, Grand Duke of Lithuania, Ruthenia, Prussia, Mazovia, etc. The original document has not survived. Its text, however, is recorded in the Register for 1546 of the Vice-Chancellor of the Kingdom of Poland (Bishop Samuel Maciejowski) which is preserved in Warszawa in the Central Archives of Ancient Documents (AGAD), as Volume 71 of the *Metryka Koronna* (Register

¹⁰¹ Franciszek Piekosiński: Średniowieczne znaki wodne. Wiek XIV [Medieval watermarks. The 14th century]. Kraków 1893, p. 7.

¹⁰² Ptaśnik, (cf. note 95), p. 135.

¹⁰³ Franciszek Piekosiński: Wybór znaków wodnych z XV stulecia [The selected watermarks of the 15th century]. Kraków 1896.

of the Crown), a folio on paper from the Prądnik Czerwony mill.¹⁰⁴ A preamble to the document, which is the earliest known document in Europe that illuminates the nature of a papermakers' statute, is reproduced in Fig.17.

Sigismundus Dei gra Rex Poloniae Imperatoris
 Duce Lituanie Russie Prussiae Mucaniae et dno
 et herede Ad perpetuam rei memoriam quod
 nam solo litterarum usu fulcitur eternitas rebus
 memoratu digna ab oblivione vindicantur proinde
 nos Sigismundus et Significamus tenore presentium
 tunc quibus interest universis presentibus et futuris
 Quia exhibiti sunt coram nobis actus per homines
 Magros ac socios artificum Papiracy unanimes con-
 sensu seu consuetudine comprobato eorum acum
 dirigentem applicatumque est nobis per dictos artifices
 et istos articulos confirmare ratificare et approba-
 re dignaremur Quorum tenor sequitur et est talis

Fig.17: A preamble to the Confirmation approved by King Sigismund I the Old in 1546 at Kraków; reproduced with permission from AGAD at Warszawa.

Following Jan Haller, some other Kraków printers were also involved in papermaking, including Mark Scharffenberg and his son Walenty, as well as Mateusz Zybeneicher. Kraków was an important centre of printing at that time, however, it was not comparable in the efficiency and productivity of printing matters with more developed centres of printing, such as the town of Cologne (Köln) in Germany¹⁰⁵; nevertheless, it was of significance to the region discussed. Kraków saw the first books in the world to be printed with Cyrillic types, shortly before 1490 by Szwajpolt Fiol (Veyl); as well as the first prints in Hungarian language (1527) by Hieronim Wietor, who printed the first Hungarian book (1533). Also, the first book entirely published in Polish was printed in Kraków (1513) by Florian Ungler, and Wietor printed the first book in Poland to be published in Greek. The Helicz brothers established a printing office (1534) in the nearby town of Kazimierz where they printed the first

¹⁰⁴ Dąbrowski/Simmons, (cf. note 14), p.46.

¹⁰⁵ Piekarski, (cf. note 95), p. 18.

Hebrew books in Poland. Stanislaus Polonus, who together with Meinard Ungut established a printing office in Sevilla, Spain, early in 1491, was also probably connected with Kraków.¹⁰⁶

Papermaking was well developed in the northern part of Poland called Pomorze, and the name, denoting the land approaching ‘up to the sea’ (‘po morze’), was transformed into Latin ‘Pomerania’ and German ‘Pommern’. In the sixteenth century paper was efficiently manufactured in the city of Gdańsk (and in its vicinity too), better known under the German name the Danzig used by the majority of its citizens. Nonetheless, the very beginnings of papermaking in this area are not clear. Quite recently, Roemer presented an interesting attempt to recapitulate the history of papermaking also in this area, see Fig.18.¹⁰⁷

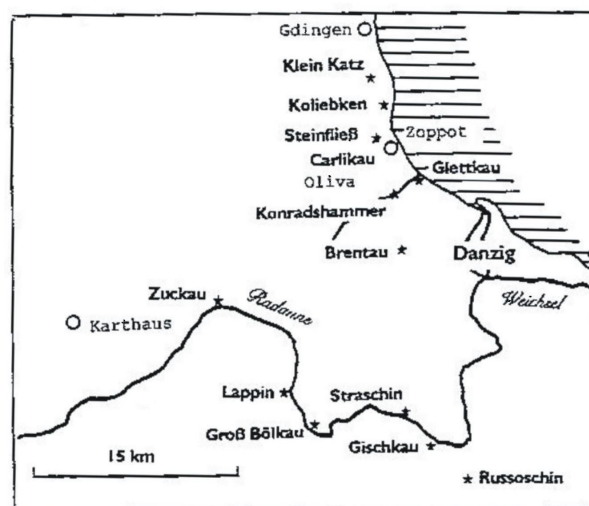


Fig.18: Papermills in the Danzig (Gdańsk) area, according to Roemer (cf. note 12, Abb. 20). Polish equivalents of the names used in the map, going from the north: Gdingen – Gdynia, Klein Katz – Mały Kack (now in Gdynia), Kolibken – Kolibki (now in Gdynia), Steinfließ – Kamienny Potok (now in Sopot), Zoppot – Sopot, Carlikau - Karlikowo (now in Sopot), Oliva – Oliwa (now in Gdańsk), Glettkau – Jelitkowo (now in Gdańsk), Konradshammer – the name of the mill, now at Przymorze in Gdańsk, Brentau – Brętowo (now in Gdańsk), Weichsel – Wisła, Radaune – Radunia, Zuckau – Żukowo, Karthaus – Kartuzy, Lappin – Łapino, Straschin – Straszyn, Groß Bölkau – Bielkowo, Gischkau – Juszkowo, Russoschin – Rusocin.

¹⁰⁶ Józef Dąbrowski: The Beginnings of Papermaking in Poland. In: IPH Congress Book, Vol. 9 (1992), pp. 63-83, here pp. 66f.

¹⁰⁷ Roemer, (cf. note 12), p. 55, Abb. 20.

Regarding the area presented in the above map, the earliest references to papermaking relate to Danzig (1473)¹⁰⁸, Groß Bōlkau (1486)¹⁰⁹, and Zuckau (1512).¹¹⁰ However, these references do not have any further confirmations, and so no early papers from these mills are known. Early papers contained as a watermark the arms of Gdańsk, in which the royal crown (granted to the town in 1457 by Casimir the Jagiellon, King of Poland) was placed inside the shield above two crosses. Sometimes the royal crown was omitted or the crown surmounted the shield; see Fig.19, according to Kohtz.¹¹¹

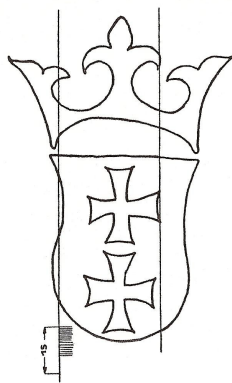


Fig.19: The earliest known watermark (reduced) of the Danzig (Gdańsk) papermill, found by Kohtz in a manuscript dated 1508.

The activities of the Gdańsk/Danzig papermill were stopped in 1611; however, the watermark with the coat of arms of this town continued to be applied in mills outside the town, also by Heinrich Probstly (Brobstly) the younger, who ran the papermill at Straszyn had been established before 1570 by Melchior Glaubicz.¹¹² Initially this mill probably used the watermark shown in Fig.20, depicting the arms of Glaubicz with the initials CG.¹¹³ In my opinion, the letters should be understood as first letters in Latin describing Glaubicz's position on the town council: *Councillor Gedanensis*.

¹⁰⁸ Ibid., p. 82.

¹⁰⁹ Ibid., p. 97.

¹¹⁰ Ibid., p. 227.

¹¹¹ Kohtz, (cf. note 64), p. 20, WZ 23.

¹¹² Budka, (cf. note 98), p. 60, note 135.

¹¹³ Jadwiga Siniarska-Czaplicka: Filigrany papierni położonych na obszarze Rzeczypospolitej Polskiej, od początku XVI do połowy XVIII wieku [Watermarks of papermills located on the territory of the Polish Commonwealth, from the beginning of the 16th c. to the middle of the 18th c.]. Wrocław 1969, wm. no. 1204



Fig.20: Watermark (reduced) depicting the arms of Glaubicz, found by Siniarska-Czaplicka (cf. note 113) in a manuscript of 1578.

Heinrich Probstly the younger also used watermarks with fish, but in a double circle, with an encircling legend containing his name and surname. His son Nathaniel continued this custom. The Straschin (Straszyn) papermill was active (with interruptions) to the middle of the nineteenth century.¹¹⁴ Many different variants of fish were applied as a motif in the watermarks of Pomeranian papermills. Before 1634, fish in a double circle were also applied as a motif of the watermark in the papermill at Bielkowo, established shortly after 1600 and belonging to the Carthusian monastery. The encircling legend refers to the ‘Carthusian Paradise of Mary’ (see Fig.21).¹¹⁵ In this mill paper was made by hand until machine papermaking was introduced, with some interruptions.



Fig.21: Early watermark (reduced) of the Bielkowo (Groß Bölkau) papermill belonging to the Carthusian monastery at Kartuzy, found by Budka (cf. note 115) in a manuscript of 1611.

Regarding other papermills present in the map (Fig.18) elaborated by Roemer, the Konradshammer mill was founded at the beginning of the seventeenth century, but the greater part of the mills was established in the second half of the seventeenth century. However, the mills founded in Gischkau, Russoschin, and Lappin were built in the eighteenth century. Some of the above-mentioned mills manufactured hand-made paper, with interruptions, until machine papermaking was introduced. The existence of a papermill at Brentau is not certain.

¹¹⁴ Roemer, (cf. note 12), p. 208-212.

¹¹⁵ Włodzimierz Budka: Review of the articles by Friedrich von Hössle in ‘Der Papier-Fabrikant’ Jg. XXXII (1934). In: *Przegląd Biblioteczny* 12 (1938), pp. 175-184, here p. 181, watermark no. 7.

Not so far from Gdańsk, a papermill was active in Elbląg. Its watermarks were published by Siniarska-Czaplicka¹¹⁶ and by Budka.¹¹⁷ Roemer published some details from the history of the Elbing papermill.¹¹⁸

An important centre of papermaking in Poland was the area surrounding the city of Poznań, the capital of Great Poland (from *Polonia Maior*, i.e. Poland the Elder), where the creation of Polish state had been started by the Piast dynasty. The first papermill in the Poznań area (Posen, in studies by Briquet) was established in 1531 at the nearby village of Zawady (now within the boundaries of Poznań); watermarks of this mill depicted two keys in saltire. The corn mill called Czerwonak was transformed into papermill about 1545. The last papermill (the fifth or sixth) founded near Poznań before 1600 was established in 1593 at the village of Główna (now within the boundaries of Poznań), and its watermarks depicted the coats of arms of subsequent Bishops of Poznań.¹¹⁹ Not so far from Poznań, in Murowana Goślina, a papermill was established about 1580, and to the northwest from Poznań, in Miałła, a papermill was founded by Stanisław Górka about 1551. His coat of arms (depicting a boat) was a motif of the watermarks used in this mill. Not so far from Miałła, there were three papermills established at the beginning of the seventeenth century, in Chełst, Herbardów, and Folsztynów.¹²⁰ Earlier, about 1585, a papermill was built in the village of Wąsosz, near the town of Złotów, owned by the Potulicki family.¹²¹ Writing paper of a high quality manufactured in this mill was found by Lindberg in Finnish archives.¹²² These mills were annexed by the Kingdom of Prussia in

¹¹⁶ Siniarska-Czaplicka, (cf. note 113), watermarks nos. 195 (1527), 192 (1613), and 194 (1617).

¹¹⁷ Budka, (cf. note 98), watermark no. 276 (1617).

¹¹⁸ Roemer, (cf. note 12), pp. 86ff.

¹¹⁹ Włodzimierz Budka: Papiernie poznańskie [The Poznań papermills]. In: *Przegląd Papierniczy* 10 (1954), pp. 216-221, 251-254.

¹²⁰ Stanisław Żurowski: Rękodzielnicze papiernictwo wielkopolskie do połowy XVII w. [Hand papermaking in Great Poland until the middle of the 17th c.] In: *Studia z Dziejów Rzemiosła i Przemysłu*, Vol. 4 (1964), pp. 97-161, here pp. 116-120.

¹²¹ Franciszek Pabich: Dzieje złotowskiej papierni w Wąsoszu [The history of the Złotów papermill in Wąsosz]. In: *Przegląd Papierniczy* 41 (1985), pp. 186ff.

¹²² Lindberg, (cf. note 3), watermark nos. 96 and 97 (both dated 1608), p. A157.

1772, and Roemer published some additional remarks on activities of these mills located in Neuteich (Chełst),¹²³ Ehrbardorf (Herbardów),¹²⁴ Follstein (Folsztynów),¹²⁵ and Wonzow (Wąsosz).¹²⁶

Turning to the east, in Przysiersk a papermill was established by Jerzy Konopacki within the years 1549-1564, in the opinion of Budka.¹²⁷ According to this author, in similar time (1551-1559) a papermill was founded in Pruska Łąka by Jan Stroband, a patrician and councilor in the city of Toruń.¹²⁸ Roemer published additional information about the Przysiersk papermill,¹²⁹ as well as about the Preussisch Lanke (Pruska Łąka) mill.¹³⁰ In the opinion of Roemer, also the city of Thorn possessed its own papermill built within the boundaries of the city; in the place marked as “K. Ort der papier mühl” found by Roemer in two copies of the “Stadtansicht von Thorn”, both dated 1659.¹³¹ According to my request, Joanna Konkolewska-Buchholz of the State Archive (Archiwum Państwowe) in Toruń, together with co-workers and historians, carried out investigations into the question, achieving the negative results. Moreover, I was kindly supplied with information about two important publications.¹³² In 1832 elaboration, Prätorius, at that time Bürgermeister of Thorn, described different mills operated from the fifteenth to the seventeenth centuries, none of them was a papermill.¹³³ Mikulski published in 1999 the detailed results gained in his thorough studies devoted (among others) to the distribution of representatives of various professions within the limited urban space of the city of Toruń and to the socio-topographical transformations in this city, from the end of the fourteenth

¹²³ Roemer, (cf. note 12), pp. 260f.

¹²⁴ Ibid., pp. 250-253.

¹²⁵ Ibid., p. 256.

¹²⁶ Ibid., pp. 219-224.

¹²⁷ Budka, (cf. note 98), p. 60, note 135.

¹²⁸ Ibid.

¹²⁹ Roemer, (cf. note 12), pp. 189f.

¹³⁰ Ibid., pp. 185-188.

¹³¹ Ibid., pp. 213ff.

¹³² Information in her letter to me dated 27 August 2001, in Toruń.

¹³³ Karl Gotthelf Prätorius: Topographische, historische, statistische Beschreibung der Stadt Thorn und ihres Gebietes [...]. Zweites Heft, Bogen 10-18. Thorn 1832, pp. 167-172.

century to the beginning of the eighteenth century. Mikulski has found neither papermill, nor papermakers in Toruń.¹³⁴

In Warszawa, a papermill was founded shortly before 1524, at that time in the Duchy of Mazovia, which became incorporated to Poland after the death of Duke Janusz (1526), the last representative of the Piast Dynasty in Poland.¹³⁵ Archbishop Jakub Uchański established (1562-65) another papermill in Mazovia, at Kęszyce.¹³⁶ Turning to the southeast from Warszawa, in a papermill at Kock owned by the Firlej family (the Lewart arms, depicting a leopard) paper production was started shortly before 1546. Earlier (1538) papermaking began in Lublin, and the mill destroyed by fire (1564) was later rebuilt and enlarged.¹³⁷ To 1593, paper was watermarked in the Lublin mill with the Topór (axe) coat of arms (see Fig.22)¹³⁸, the most popular motif among sixteenth-century Polish watermarks.



Fig.22: Watermark (reduced) of the Lublin papermill, depicting the Topór (axe) coat of arms, found by Budka (cf. note 98) in a manuscript of 1545.

The Lublin mill, with its four waterwheels, was the largest Polish papermill at that time, and its location and appearance were portrayed in 1956 by Walczy¹³⁹ (see Fig.23), in accordance with extant descriptions of the mill and with the

¹³⁴ Krzysztof Mikulski: *Przestrzeń i społeczeństwo Torunia od końca XIV do początku XVIII wieku* [The urban space and the community of Toruń from the end of the 14th c. to the beginning of the 18th c.], Toruń 1999.

¹³⁵ Kazimierz Sarnecki: *Dokumenty dotyczące założenia pierwszej papierni w Warszawie* [Documents on the establishment of the first papermill in Warszawa]. In: *Przegląd Papierniczy* 10 (1954), pp.119ff.

¹³⁶ Włodzimierz Budka, Jadwiga Siniarska-Czaplicka: *Papiernia arcybiskupów gnieźnieńskich w Kęszycach pod Łowiczem* [Papermill owned by the Archbishops of Gniezno in Kęszyce near Łowicz]. In: *Archeion* 42 (1965), pp. 229-248.

¹³⁷ Włodzimierz Budka: *Papiernie w Lublinie i Kocku* [Papermills in Lublin and Kock]. In: *Archeion* 25 (1956), pp. 257-275.

¹³⁸ *Ibid.*, (cf. note 98), watermark no. 207.

¹³⁹ Stefan Walczy: *Rekonstrukcja zabudowań papierni lubelskiej według widoku Brauna* [Reconstruction of buildings of the Lublin papermill in the accordance with its view presented by Braun]. In: *Archeion* 25 (1956), pp. 276-280.

seventeenth-century engraving published in Cologne by Georg Braun (*Theatrum praecipuarum totium mundi urbium*) with the view of Lublin.

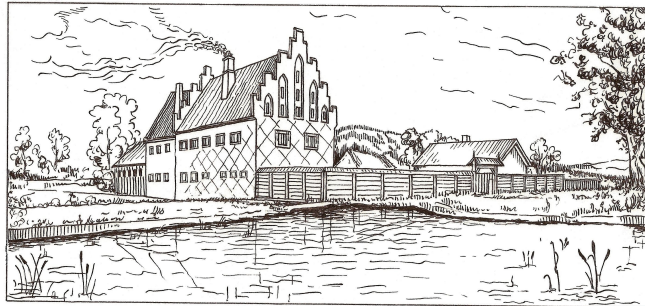


Fig.23: An image of the sixteenth-century papermill at Lublin, presented in 1956 by Walczy, an architect-conservator (cf. note 139).

In northern Poland usually burghers initiated papermaking; however, in other areas noble families and representatives of the Catholic clergy were much more active in establishing papermills, and therefore coats of arms of the noble families are a prevalent motif in Polish watermarks. The still growing production of paper in Poland, almost until the mid-seventeenth century with about forty papermills, resulted in neighbouring countries also being supplied with paper from Poland. There is a lack of any concrete statistics; however, the watermark albums mentioned above, such as the albums published by Tromonin, Likhachev, Briquet, and Laucevičius, clearly documented Polish exports of paper to the east and south of Europe. Paper from northern Poland, mainly from papermills in Gdańsk/Danzig and in its vicinity, was sent also to Lithuania, Russia, and Finland.¹⁴⁰ Paper from southern Poland was exported to Slovakia and Hungary, and via Lwów was sent to Moldavia, and probably also to Persia.¹⁴¹ Most likely, the Odrzykoń papermill in south-eastern Poland (established before 1546) manufactured paper with the coat of arms of Moldavia, which was sometimes supplemented with the crowned Eagle of Poland above the shield; this paper was exported to Moldavia.¹⁴² Other examples

¹⁴⁰ Lindberg, (cf. note 3), watermark nos. 86-91, 96-97, 369-380, pp. A157, A175.

¹⁴¹ Mieczysław Gębarowicz: Z dziejów papiernictwa XVI-XVIII w. [From the history of papermaking within the 16th-18th c.]. In: *Roczniki Biblioteczne* 10 (1966), pp. 1-114, here pp. 75-79.

¹⁴² Jadwiga Siniarska-Czaplicka: *Katalog filigranów papierni polskich 1500-1800 r.* [Catalogue of the watermarks used by Polish papermills from 1500-1800]. Łódź 1983, p. 5, watermark nos. 39-49.

of Polish watermarks are quite frequently shown in albums presenting the watermarks traced from sixteenth-century manuscripts produced on territories now belonging to Romania¹⁴³ and Ukraine.¹⁴⁴

Wacław Potocki (1621-96), a Polish poet, should be remembered here as the author of this epigram on paper quoted here in its Polish original, as well as in a English version, the latter as a free translation by John S.G. Simmons:

<i>Próżna ufność w marmurze</i>	<i>Marble is uncertain</i>
<i>Próżna i w żelazie</i>	<i>And iron may decay</i>
<i>To trwa do skonu świata</i>	<i>But what one writes on paper</i>
<i>Co na papier wlezie</i>	<i>Will live to the world's last day</i>

The initiatives of Polish noble families and of the Catholic clergy were also significant for the beginning of papermaking in territories near Lwów (now Lviv, also known as Lemberg), establishing old traditions of papermaking in today's Ukraine. Sixteenth-century papermills were founded there, and the first well-documented papermill was established in 1539-41 at Busk by Andrzej Górka, whose coat of arms (depicting a boat) was perceived as a watermark in papers made by hand in Busk until 1586.¹⁴⁵ As it was recalled, this influential Polish family had another paper mill in Miała (north of the city of Poznań), which marked its paper with the same coat of arms.¹⁴⁶ The activities of the Busk mill are well documented until the middle of the seventeenth century, and much later another paper mill was operated again at that town, albeit for rather a short period, only in the period 1783-88.¹⁴⁷

¹⁴³ Alexandru Mareş: Filigranele hîrtiei întrebuintate în ţările Române în secolul al. XVI-lea [Watermarks in papers used in the Romanian Principalities in the 16th c.]. Bucureşti 1987. [Tracings of 1757 watermarks, among them 1510 foreign watermarks, in which watermarks of Polish mills are frequent - JD].

¹⁴⁴ Karol Badecki: Znaki wodne w księgach archiwum miasta Lwowa 1382 -1600 R. [Watermarks in volumes in the Lwów municipal archives, 1382-1600]. Lwów 1928. [Tracings of 166 watermarks, mainly of Polish mills – JD].

¹⁴⁵ Gębarowicz, (cf. note 141), pp. 13-34.

¹⁴⁶ Żurowski, (cf. note 120), p. 117.

¹⁴⁷ Orest J. Matsiuk: Papir ta filigrani na ukrajnskykh zemliakh [Paper and watermarks in Ukrainian lands]. Kyjiv 1974, pp. 29f.

Walenty (Foltyn) Kmeller, a Polish papermaker and the son of Jan Kmeller who owned the Prądnik Czerwony mill near Kraków (within the years 1562-75), built a few early papermills in the vicinity of the town of Lwów. Shortly after 1576 Kmeller built the papermill at Łowczyce (now Łiwčyci), which remained active until 1612. In 1599 this papermaker transformed the corn mill at Brzuchowice (now Briuchowyči) into the municipal papermill of the town of Lwów (Lviv), which was closed in 1609. After that Kmeller started making paper by hand in Zaszaków (now Zaškiv), on land owned by the Dominicans of Lwów, and the papermill was active until 1655.¹⁴⁸ Shortly before 1573 the Dominicans of Łuck established the Nowy Staw (now Nowostaw) papermill, which was operated almost until 1600. There is a lack of documents about the activities of the mill in the seventeenth century; however, papers made later in this village (dated 1730) are known.¹⁴⁹ About 1610 the Trzeciński family established a paper mill at Rawa Ruska (in Ukrainian Ravo Rus'ka); now not so far from the present Polish-Ukrainian border. Papers from this mill watermarked with their Rawicz (Rawa) arms (depicting a maiden on a bear), are known from the years 1610-41.¹⁵⁰

The last sixteenth-century papermill was established in 1595 at Ostrog by the Ostrogski family of the Ukrainian aristocracy, to support typographic activities of the printing office founded there earlier.¹⁵¹ The mill was active until 1654.¹⁵² Before 1624, the Radomyszl papermill was established to manufacture paper for the printing office in Pečerska Ławra, the famous Orthodox monastery (now within the boundaries of Kyjiv) and the spiritual capital of the Ruthenia. The Archimandrite Elisues Pleteniecki, the head of the monastery, initiated both investments. This mill, the most distant in south-eastern Ruthenian land of the Commonwealth, was operated until the 1680s, although there was a long break

¹⁴⁸ Anna Jędrzejowska: Przyczynek do dziejów papiernictwa lwowskiego [A contribution to the history of papermaking at Lwów]. In: *Kwartalnik Historyczny* 37 (1923), pp. 129-133.

¹⁴⁹ Matsiuk, (cf. note 147), pp. 59f, watermark nos. 433, 558.

¹⁵⁰ Siniarska-Czaplicka, (cf. note 142), p. 24, watermark nos. 855-863.

¹⁵¹ Gębarowicz, (cf. note 141), pp. 55-62.

¹⁵² Matsiuk, (cf. note 147), pp. 60f.

after 1648.¹⁵³ One of the watermarks used in the Radomyszl papermill is shown below (Fig.24), together with reproductions of two other watermarks (from mills at Busk and in Ostrog) published by Matsiuk.¹⁵⁴

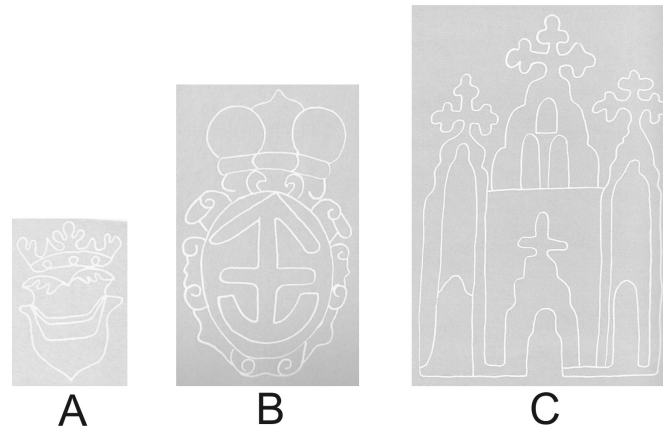


Fig.24: Watermarks (reduced) of the following mills, from the left: a) Busk, dated 1547; b) Ostrog, dated 1598; c) Radomyszl, dated 1689; all found by Matsiuk (cf. note 147).

The wars in the middle of the seventeenth century resulted in an economic collapse in the Ruthenian part of the Commonwealth, and in addition, the Truce of Andrusovo (1667) handed Kyjiv and left-bank Ukraine to Russia. This made alterations in paper stocks used for printing books on Ukrainian territory which had become separated from the Commonwealth. In the second half of the seventeenth century, these stocks became similar to papers used in printing offices at Moscow,¹⁵⁵ with a large admixture of French papers, manufactured with Dutch enterprise and capital, which were exported to Russia via Amsterdam. Quite recently, Matsiuk¹⁵⁶ published 714 tracings of watermarks, mainly from the turn of the nineteenth century; he documented the variety of papers manufactured in different countries, which were used as the basis of the written records kept in Ukrainian archives.

¹⁵³ *Ibid.*, p. 62.

¹⁵⁴ *Ibid.*, watermark nos. 209 (Busk), 366 (Ostrog), 628 (Radomyszl).

¹⁵⁵ Tatiana W. Dianova: *Filigrani XVII wieku po staropieczatnym knigam Ukrainy i Litwy* [Seventeenth-century watermarks according to old prints of Ukraine and of Lithuania]. Moskwa 1993, pp. 6-7.

¹⁵⁶ Orest Matsiuk: *Filigrani archiwnych dokumentiw Ukrainy, XVIII-XX st.* [Watermarks in archival documents of Ukraine, 18th – 20th c.]. Kyjiv 1992.

Progress in hand papermaking in territories of today's Ukraine may be perceived around 1800.¹⁵⁷ Probably the largest papermill was built in the Brody estate, owned by the Potocki family. Making paper by hand was started there in 1830, manufacturing about 6400 reams of writing paper per year, watermarked with the coat of arms of the Potocki family (the Pilawa arms) and with the counter watermark BRODY. The last (known to Matsiuk) watermark of this mill is dated 1842.¹⁵⁸ To rebuilding and industrialising the Brody estate, the Polish aristocratic family had engaged (within the years 1826-31) Józef Bem, who later on, during 'Springtime of the Nations' in Hungary, showed his talents as a soldier and commander (from December 1848 to 9 August 1849).¹⁵⁹

A few papermills described by Bogdán, in his history of papermaking in the Kingdom of Hungary, are situated now in south-western Ukraine. Bogdán mentioned activities of a papermill in Munkács in the second half of the seventeenth century, producing writing paper watermarked with the arms of this town.¹⁶⁰ Before 1780, paper manufacture was started in Ravaszmező and it was continued (even after 1840) to produce mainly writing paper. Within the years 1780-1825 this papermill was owned by the Teleki family of the Hungarian aristocracy, and their coat of arms was a motif of watermarks applied in this mill. In the nineteenth century the inscription DOLHA was also used.¹⁶¹ In a papermill at Huszt writing paper was manufactured before and after 1793.¹⁶² In the village of Alsóhrabonica a papermill was established in 1793 by the Schönborn family, manufacturing mainly writing and printing papers. There were such motifs of watermark as the Schönborn arms, as well as the inscriptions D.MUNKÁCS or A.HRABONICZA W N.¹⁶³

¹⁵⁷ Ibid.: Istorija Ukrajskogo Paperu [The history of Ukrainian paper]. Kyjiv 1994, pp. 153-158.

¹⁵⁸ Ibid., (cf. note 147), pp. 53f, watermark nos. 378-390.

¹⁵⁹ Bolesław Orłowski: Bem Józef Zachariasz (1794-1850). In: Słownik Biograficzny Techników Polskich [The Dictionary of Polish Technicians]. Vol. 13. Warszawa 2002, pp. 18f.

¹⁶⁰ Bogdán, (cf. note 62), p. 194.

¹⁶¹ Ibid., pp. 210ff.

¹⁶² Ibid., p. 180.

¹⁶³ Ibid., p. 158.

Having repeated the remarks published by Bogdán, Matsiuk presented tracings of the watermarks found during his own investigations. In the opinion of Matsiuk, a papermill in Mukačewe (formerly Munkács) produced a considerable quantity of paper in the first quarter of the nineteenth century. He published one watermark of this mill.¹⁶⁴ Regarding a papermill in Lysyčewe (formerly Ravaszmező), Matsiuk presented two watermarks of this mill.¹⁶⁵ Also two watermarks traced from papers manufactured at Nižnja Grabiwnycja (formerly Alsóhrabonica) can be found in his 1974 publication.¹⁶⁶ Three additional watermarks, selected from the collection published by Matsiuk, are reproduced in Fig.25.¹⁶⁷

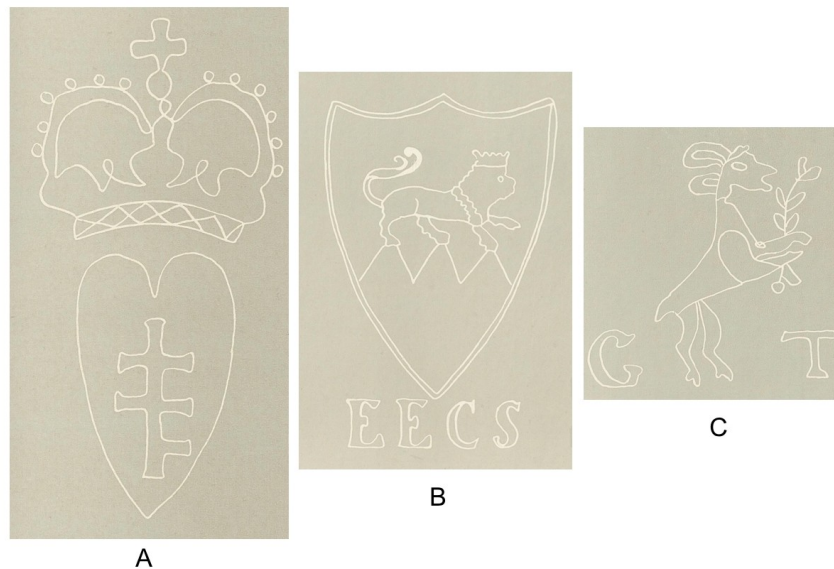


Fig.25: Watermarks (reduced) of the following mills, from the left: a) Brody, with the coat of arms of the Potocki family (1830); b) Mukačewe (formerly Munkács), with the coat of arms of the town (1802); c) Lysyčewe (formerly Ravaszmező), with the coat of arms of the Teleki family (1812) - all watermarks found by Matsiuk (cf. note 147). Each watermark is reproduced here without its counter watermark.

In Poland, the disastrous wars in the middle of the seventeenth century, especially the so called ‘Swedish deluge’ (1655-60), resulted in irreparable losses also to papermaking, so that it never again achieved that importance in

¹⁶⁴ Matsiuk, (cf. note 147), p. 54, watermark no. 462 (1802) with the counter watermark MUNKACS.

¹⁶⁵ Ibid., p. 48, watermark nos. 654 (1812) with the counter watermark DLOHA [probably an err – JD], 655 (1841) with the initials GT (beneath the crown) and the inscription DOLHA.

¹⁶⁶ Ibid., p. 57, watermark nos. 463 (1822) and 478 (1821), both with the inscription DMUNKACS.

¹⁶⁷ Ibid., watermark nos. 378 (1830), 462 (1802), and 654 (1812).

Central and Eastern Europe which it had gained in the sixteenth century and the first half of the seventeenth century. After the wars, Poland became an importer of paper because the larger part of the domestic papermills had been destroyed and there was a lack of rags for those mills which had survived the wars. Budka¹⁶⁸ documented the latter fact in his analyses of the records describing activities of the so-called 'Great Balance' in Kraków, which survived from the years 1638-85. The yearly average amount of rags for papermaking, as seen from the reports within the years 1638-53, i.e. before the Swedish invasion, was about 770 hundredweight. However, according to the data from 1663-85, i.e. after the invasion, the yearly average amount of rags for papermaking sold in Kraków was reduced to only 168 hundredweight, i.e. to about one fifth (22% to be precise) of those supplied before the 'Swedish Deluge'. According to the calculations done by Budka, about 3850 to 5390 reams of paper (depending on the paper format) could be manufactured from the rags for papermaking sold yearly in Kraków before the Swedish invasion; however, only about 840 to 1180 reams, could be produced after that invasion. Moreover, an acute shortage of the rags of higher quality, which enable both a high quality of paper and a higher output of the paper manufacture, should be taken into account, as this might have been experienced after any exhausting war. Considering the very strong competition in the international paper market, it was impossible to rebuild the former position of Polish papermills, which were not even able to satisfy the domestic demand for paper. This situation was quickly recognised by foreign paper suppliers, and Poland became dependent on paper imports from Silesia, Bohemia, Upper Hungary (Slovakia), the German States, as well as on French/Dutch imports; the domestic paper manufacture was rather limited to lower grades of writing paper, packaging paper, and 'waterleaf' paper; the latter applied to cheaper prints.

¹⁶⁸ Włodzimierz Budka: *Z dziejów papiernictwa krakowskiego w XVII wieku. Prace z dziejów Polski feudalnej ofiarowane Romanowi Grodeckiemu* [From the history of Kraków papermaking in the 17th c. Works on the history of feudal Poland presented to Roman Grodecki]. Warszawa 1960, pp. 483-488.

Traditions of making high quality papers by hand were continued in Poland in the second half of the eighteenth century, starting from the Jeziorna mill (near Warszawa), established by Baron Josef Kurtz (or von Kurz) in 1774. Stanislaw August Poniatowski, the last King of Poland, supported this initiative by the last great actor and author of German improvised comedy. This Royal Papermill initially applied the coat of arms of the King, also the Kurtz arms, as motifs of its watermark. Later on, the mill was enlarged and the manufacture of high-quality hand-made papers (also stamped papers) was continued after machine papermaking was introduced (1838) to the Jeziorna mill, which since the 1890s became known as Mirków; and any other names were not in use in the history of this papermill. The traditional process of making paper by hand, from long-fibred pulps and with gelatine sizing, was stopped there very recently, in the early 1990s.¹⁶⁹ Since 1998, the oldest part of this mill is in the possession of the KONSTANS papermill (now in the town of Konstancin-Jeziorna), together with the Museum of Papermaking in which the moulding plant is still in use.¹⁷⁰

Before the end of the eighteenth century, three Partitions of the Polish-Lithuanian State were carried out in 1772, 1793, and 1795. Austria established the Kingdom of Galicia and Lodomeria on the territories annexed in 1772, referring to short possession (in the thirteenth century) of the strongholds in Halicz and Vladimir by Hungarians Kings, who had used after that the title *rex Galiciae et Lodomeriae*. Some paper historians of those countries which annexed territories of the Commonwealth introduced the paper history of the annexed territories (also the history before the annexation) into the stream of the paper history of their own countries.¹⁷¹ It does not mean, however, that these

¹⁶⁹ Ibid.: Kto i kiedy założył papiernię w Jeziornie? [Who and when has founded the papermill at Jeziorna?]. In: *Kwartalnik Historii Nauki i Techniki* 25 (1980), pp. 537-543. Dąbrowski/Siniarska-Czaplicka, (cf. note 13), pp. 361f.

¹⁷⁰ KONSTANS, <http://konstans-papier.com.pl/muzeum> [in Polish & English]

¹⁷¹ Georg Eineder: The ancient paper-mills of the former Austro-Hungarian Empire and their watermarks. Hilversum 1960, pp. 151-156. Günther Bayerl: Die Papiermühle. Vorindustrielle Papiermacherei auf dem Gebiet des alten Deutschen Reiches—Technologie, Arbeitsverhältnisse, Umwelt. Teil I. Frankfurt am Main 1987 (Europäische Hochschulschriften, Bd. 260,1), Abb. 153, Abb. 155.

presentations are a reliable source of information. In the nineteenth century, paper manufacture developed well mainly in Russian part of Poland, and watermarks of Polish mills are frequent in the watermark album published by Klepikov.¹⁷² On the small territory of the Congress Kingdom of Poland, established during the Congress of Vienna (1814-15) and subordinate to Russia, 34 papermills manufactured yearly about 67 thousand reams of paper, according to the official (but not fully completed) register of 1823, with two larger mills in Jeziorna and at Solec, each of them manufactured yearly about 8 thousand reams of hand-made paper.¹⁷³

At the end of this discussion of ancient hand papermaking in the northern part of Central and Eastern Europe, there is a need to present some remarks about this craft in western parts of today's Poland, within the frontiers established in 1945 according to the will of the Three Powers who, while reducing Polish territory, moved Polish frontiers westward. This part of German papermaking craft was also of significance for Central and Eastern Europe, as may be perceived in the watermark albums by Tromonin, Likhachev, Laucevičius, and Mareş; as well as for Scandinavia, as demonstrated in the album by Lindberg. And therefore examples of the longer-active papermills in these regions, which became part of modern Poland, should be presented here in short, as part of the German heritage. Earlier German publications devoted to such topics are not readily accessible, and currently published German elaborations devoted to the paper history of the western parts of modern Poland are rather rare.

In Western Pomerania at least two papermills should be mentioned: the municipal papermill of Stolp and the Hohenkrug mill near Stettin. Regarding the first one, von Hössle wrote: „Im Jahre 1592 wurde von der Stadt Stolp in Raths-Damnitz an der Schottow eine alte Kornmühle zu einer Papiermühle umgebaut

¹⁷² Sokrat A. Klepikov: Filigrani na bumage ruskogo proizvodstva XVIII – nachala XX weka [Watermarks in paper of the Russian manufacture from the 18th c. to the beginning of the 20th c.], Moskwa 1978.

¹⁷³ Włodzimierz Budka: Wykaz fabryk papieru w Królestwie Polskim z r. 1823 [The register of papermills in the Congress Kingdom of Poland of 1823]. In: Przegląd Papierniczy 12 (1956), pp. 248ff.

und an Papiermacher verpachtet.“¹⁷⁴ This means that the municipal papermill of Stolp (now Słupsk) was located in Raths-Damnitz (now Dębica Kaszubska) on the Schottow (now Skotawa) River. Andreas Pirast is the first known papermaker (1620) in this mill, which was later run by his son, also Andreas. Thereafter von Hössle mentioned:

Später scheint die Stadt an der Papiermühle kein Interesse mehr gehabt zu haben und verkaufte das Werk im Jahre 1756 an den Papiermacher J.G. Adam; zum Privatbesitz geworden, führte sie nun die Bezeichnung Rathsdamnitzer Papiermühle; sie war mit Hadernschneider, Stampfwerken, zwei Bütten und einem Schlaghammer ausgerüstet.¹⁷⁵

The watermark reproduced below recalls the early papers of this papermill which were watermarked with the Griffon of Pomerania (Fig.26).¹⁷⁶ In watermarks of this mill the surname ‘Pirast’ is sometimes presented as ‘Birast’.

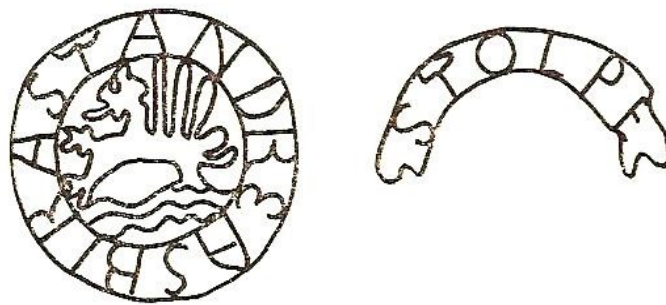


Fig.26: Watermark and counter watermark (both reduced) of the Stolp (now Słupsk) municipal papermill, situated in Raths-Damnitz (now Dębica Kaszubska), found by Pabich (cf. note 176) in a manuscript of 1644.

Von Hössle recalled the ancient privilege, on establishing the first papermill in Western Pomerania (Vorpommern) in the vicinity of the town of Stettin (now Szczecin), dated 2 February 1528, characterising its text as *plattdütsche*. The beginning of the privilege is as follows:

Wy Jurge und Barnym, gebruder van gades gnaden hertogen tho Stettyn Pameren, der Cossuben und Wenden, fursten tho Rugen und graven tho Gutzkow, bekennen vor

¹⁷⁴ Friedrich von Hössle: Alte Papiermühlen der deutschen Küstenländer. In: Der Papier-Fabrikant, H. 49 (1922), p. 1689.

¹⁷⁵ Ibid.

¹⁷⁶ Franciszek Pabich: Z dziejów papierni słupskiej [From the history of the Słupsk papermill]. In: Przegląd Papierniczy 30 (1974), pp. 197ff, watermark no. 4.

uns, unse erven und nakamende herschop, dath wy myt dem ersamen unsen leven getruven Jost Klopffer uns van wegen einer papirmolen, de he in unser stath thom Damme to buwende vorgenamen, up navolgende gestalth vordragen und vorgelyket hebben, also dat wy genanthen Jost Klopffer de stede tho buwinge sulker molen in genanther unser stath Dham up dem strom der Plone under den andern molen [...].¹⁷⁷

The papermill built by Jost Klopfer was in the vicinity of the bridge over the Plöne River, as von Hössle wrote:

Die uralte, von Stettin nach Stargard führende Straße überquert südöstlich von Altdamm die vom Plöne- und Madüsee herabfließende Plöne. Wegen der am Kreuzungspunkt hohen Ufer erhielt die Brücke den Namen „Hohe Brücke“ und der am rechten Ufer stehende Krug hieß „Zum hohen Krug“; [...] stand diese erste Dammer Papiermühle „eine Buchsenschuss unterhalb der Hohen oder Buchholtzischen Brücke.“¹⁷⁸

A second papermill was built there by Hans Bayer according to the privilege given by Herzog Johann Friedrich in 1579. Von Hössle reproduced the watermark of this mill (Fig.27).¹⁷⁹ Once again, the Griffon of Pomerania is the motif of the watermark, and the encircling legend is explained by von Hössle as referring to Philipp Julius, Herzog zu Stettin Pommern.¹⁸⁰ Paper from the Hohenkrug mill was exported to Scandinavia.¹⁸¹



Fig.27: Watermark (reduced) of the Hohenkrug papermill dated 1610, according to von Hössle (cf. note 177).

¹⁷⁷ Friedrich von Hössle: Alte Papiermühle der deutschen Küstenländer. In: Der Papier-Fabrikant, H. 42 (1922), pp. 1461-1467, here p. 1462.

¹⁷⁸ Ibid., p. 1461.

¹⁷⁹ Ibid., p. 1463, Abb. 39.

¹⁸⁰ Ibid.

¹⁸¹ Lindberg, (cf. note 3), watermark nos. from 474 to 478 (dated from 1587 to 1616), p. A183.

After the Thirty Years' War, the Truce of Luneville (1648) handed the region of 'Vorpommern mit Stettin' to Sweden. Battle broke out again in 1659, and owing to the activities of the German troops "waren die beiden ersten Papiermühlen zu Damm von der Bildfläche verschwunden".¹⁸² The new papermill was built „oberhalb der Hohen Brücke“ in 1691: „Der bei dem Neubau mitwirkende Papiermacher Elias Heschke aus Touchel in Polen wurde erster Pächter der Kurfürstlich Colbatzschen Papiermühle.“¹⁸³ The new papermill was „etwa einen Pistolenschuss über der hohen Brücke ausgebaut“.

After the death of Heschke, the widow married the "Papiergeselle Münch aus Schlesien".¹⁸⁴ The papermill had been run for about 150 years by the Münch family. In 1740 Hollander beaters were installed in the mill. It was burnt down in 1756; nonetheless, the mill was successfully rebuilt in 1763 by the widow Münch. The ream cover, a woodcut printed in black, used in the Hohenkrug mill, run by the widow Münch and her son Friedrich Wilhelm Münch, is reproduced (Fig.28).¹⁸⁵

¹⁸² Von Hössle, (cf. note 177), p. 1463.

¹⁸³ Ibid., p. 1464.

¹⁸⁴ Ibid.

¹⁸⁵ Wolfgang Schlieder: Riesaufdrucke. Volkstümliche Grafik im alten Papiermachergewerbe. Leipzig 1988, pp. 136f.



Fig.28: The ream cover for paper of the Hohenkrug mill, after Schlieder (cf. note 185).

„Dieser Riesenaufdruck stellt insofern eine Ausnahme dar, als er zur Bezeichnung von Druckpapier diente (Relation = Bericht, Zeitung). Er bildet den mit dem Königsmonogramm belegten preußischen Adler ab und gibt, neben der Papiersorte und dem abgekürzten Namen des Papiermühlenpächters, auch das Gewicht des Rieses (11 Pfund) an.“

In his article, von Hössle discussed four papermills built in almost the same location in the years 1528, 1579, 1691, and 1763, recalling their different names; “zu Damm”, “Kurfürstlich Colbatzschen Papiermühle”, and “Hohenkrug”. However, the last name is most popular in denoting the entire story of papermaking in the place near the “Hohe Brücke” on the Plöne River, which later was also called “Hohenkrug” (today Struga, within the town boundaries of Szczecin). In 1845 a paper-making machine was introduced there, and making paper by hand was stopped.

Quite recently the Hohenkrug papermill was recalled as a part (since 1925) of the former ‘Feldmühle’ Holding Company, the owner (among others) of the large pulp & paper mill in the nearby Odermünde.¹⁸⁶ Production facilities of both these mills were looted by the Red Army in 1945; however, the buildings of the

¹⁸⁶ Hans-Peter Jaraczewski: Lecture on the former „Feldmühle” until 1945. In: IPH Congress Book, Vol. 15 (2004), pp. 53ff.

papermill in Skolwin (formerly Odermünde) were later repaired and equipped with production facilities.¹⁸⁷

Johann Samuel Hering, Professor of Law, should be remembered here, as the author of two printed pamphlets (Alte-Stettin 1736) in which watermarks were reproduced for the first time in print in Central and Eastern Europe. Recently this fact was thoroughly discussed by Schmidt.¹⁸⁸

Going to the southeast, the papermill was established (1733) at Berlinchen (now Barlinek). In the opinion of von Hössle:

Das Erzeugnis dieser Papiermühle muß gut gewesen sein; denn die Ortsgeschichte berichtet, dass viel Papier über Stettin nach Schweden geliefert worden ist, war doch der Wasserweg nach dorten äußerst bequem.¹⁸⁹

In 1842 a paper-making machine was installed there; however, at the end of the 1860s the paper factory was transformed into the corn mill.

Further south from the Hohenkrug mill, in the former Neumark, another ancient papermill was located at the town of Neudamm (now Dębno): “Der Papiermacher Hans Bauerfeindt wurde 1570 für zehn Jahre auf die ,neuerbaute Papiermühle zum Tham’ als Verwalter eingesetzt.“¹⁹⁰ In early watermarks of the mill the name THAM is used (Fig.29), later NEUDAM, and finally NEUDAMM.

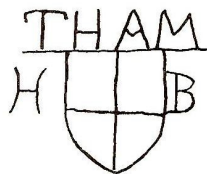


Fig.29: Early watermark (reduced) of the papermill in Neudamm (now Dębno), found by Briquet (his no. 1238) in a manuscript dated 1580, after von Hössle (cf. note 190).

¹⁸⁷ Maciej Szymczyk: Polski przemysł papierniczy: 1945-1989 [Polish paper industry: 1945-1989]. Duszniki Zdrój 2007, pp.75-80.

¹⁸⁸ Schmidt, (cf. note 46), pp. 18f.

¹⁸⁹ Friedrich von Hössle: Alte Papiermühlen der Provinz Brandenburg. In: Der Papier-Fabrikant, Heft 17 (1933), p. 260.

¹⁹⁰ Ibid. In: Der Papier-Fabrikant, H. 16 (1933), pp. 248-251, here p. 248f., Abb. 25.

At that time, it was a large mill (Fig. 30) in which about 3000 reams of paper were yearly manufactured, consuming rags and additionally “¼ Zentner Alaun und 8 Tonnen Kalk” in this production.

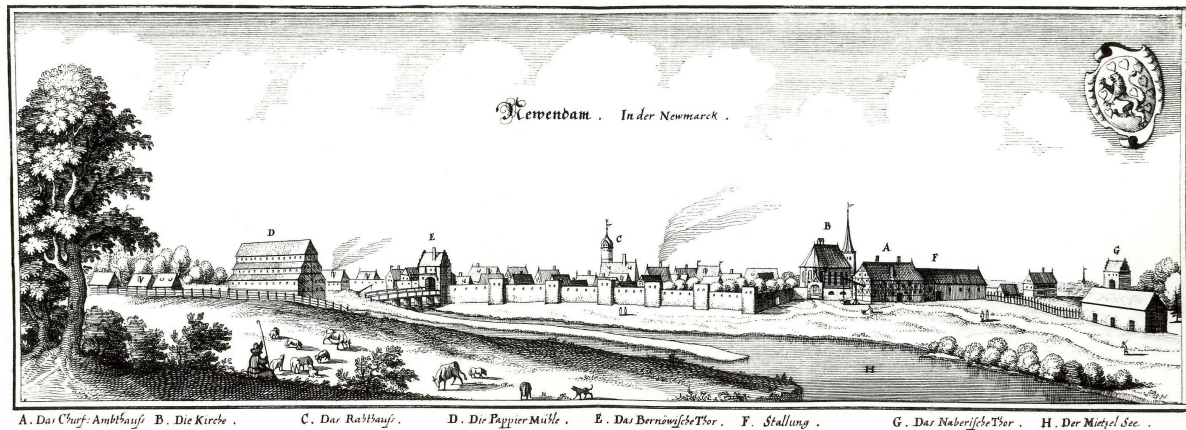


Fig.30: A view of the town of Neudamm (now Dębno) in the 1620s (by Matthäus Merian) with the large papermill equipped with two vats (D=Die Pappier Mühle). The scan was kindly offered by Prof. Jan Harasimowicz of the University of Wrocław.

Making paper by hand was stopped there in 1850, and the buildings were adapted to the printing house. In the Neudamm mill: „Um 1670 wird ein Papiermacher Joachim Schottler aus Polen als Pächter erwähnt.“¹⁹¹ Later, five generations of his descendants worked efficiently in German papermaking.¹⁹²

To the southeast from Neudamm, in Grünberg (now Zielona Góra) a papermill was founded probably in the middle of the sixteenth century. However, the earliest known watermark of this municipal papermill, situated in the nearby village of Krampe (now Krepka), is dated 1581.¹⁹³ Early watermarks of this papermill depicted the coat of arms of the town of Grünberg. In 1727 this municipal papermill was sold to Jeremias Scholtz, its last tenant. Making paper by hand was continued there until introducing (1845) a paper-making machine.¹⁹⁴ Hand-made paper from this mill was exported to Scandinavia.¹⁹⁵

¹⁹¹ Ibid.

¹⁹² Ibid., In: Der Papier-Fabrikant, H. 48 (1933), p. 631.

¹⁹³ Hugo Schmidt: Geschichte der Stadt Grünberg, Schles. Grünberg 1922, pp. 253f.

¹⁹⁴ Ibid., pp. 263ff.

¹⁹⁵ Lindberg, (cf. note 3), watermark no. 243, p. A167.

Further south from Grünberg, a papermill was active in Sagan (now Żagań). “Den etwa 2 Kilometer westlich von der Stadt in dem großen Stadtforst liegende Weiler Schönthal fand Herzog Wenzel Eusebius von Lobkowitz 1669 für sehr geeignet, eine Papiermühle an der Tschirne zu errichten.”¹⁹⁶ However, this papermill was established earlier, von Hössle published two watermarks of this mill dated 1620 and 1637.¹⁹⁷ The coat of arms of this town was a frequent motif of watermarks applied in this mill. Hand-made paper was manufactured there until introducing a paper-making machine in 1850.¹⁹⁸

Much earlier a papermill was founded near Liegnitz (now Legnica) in Altbeckern (now Stare Piekary). Ptaśnik found in Kraków the document (dated 3 October 1511) in which “Stefanus papirmacher de Legnycz” was mentioned.¹⁹⁹ This means that the “Liegnitzer Papiermühle” was established before 1511. However, the earliest information about this mill known to von Hössle is the privilege given (19 November 1535) by Herzog Friedrich II to “Papiermacher Fetscher aus Ravensburg”, before that time employed at Trautenau (Trutnov) in Bohemia.²⁰⁰ Early watermarks of the Liegnitz mill depict the town arms: the Eagle of Silesia and two keys in saltire.²⁰¹ The papermill was active until its converting (1854) into an oil mill.²⁰²

Undoubtedly, the earliest papermaking in Lower Silesia was started in a papermill built in Breslau (now Wrocław, also known as Vratislav). The exact date of its foundation remains unknown, and a watermark of this mill found by Rauter in a manuscript dated 1477 seemed to be the earliest one.²⁰³ The

¹⁹⁶ Friedrich von Hössle: Alte Papiermühlen der Provinz Schlesien. In: Der Papier-Fabrikant, H. 45 (1935), pp. 369f.

¹⁹⁷ Ibid., Abb. 47 (1620), Abb. 48 (1637).

¹⁹⁸ Ibid.

¹⁹⁹ Ptaśnik, (cf. note 95), document, no. 139.

²⁰⁰ Von Hössle, (cf. note 196), p. 357

²⁰¹ Ibid.

²⁰² Ibid., p. 358.

²⁰³ Fr. von Hössle: Alte Papiermühlen der Provinz Schlesien. In: Der Papier-Fabrikant, H. 2 (1935), pp. 10f., Abb. 2.

papermill was established earlier; as a watermark dated 1475 which is characteristic of that mill shows (Fig.31).²⁰⁴



Fig.31: Probably the earliest known watermark (reduced) of the papermill at Breslau (now Wrocław, also known as Vratislav) found by Tromonin in a manuscript dated 1475.

The watermark depicts a bull's head with elongated horns, and between the horns a serpent entwined shaft, terminating in a monogram W with a crown above, i.e. part of the Wrocław arms in which the monogram W is seen, from first letter of the town's name. The monogram W alone with a crown above was also applied later as a motif of the watermark in this mill, as well as the coat of arms of the town or its other parts. Regarding papermakers, at the end of the 1500s a document was found in the Wrocław archive, dated 6 February 1490, with an obligation to Hans Haunolt, a papermaker in this mill, to pay a rent to the town.²⁰⁵ The next document mentioning this mill is dated 1497, and from 1507 Stephan Stempfer (of Basel) is known as 'Breslauer Papiermüller'. The mill was active, with some interruptions, until the fire in 1843.²⁰⁶

Another medieval papermill was established in Schweidnitz (now Świdnica, also known as Svídnice). Von Hössle wrote: „Die Gründungszeit ist nicht genau bekannt, doch liegt sie vor 1490!“²⁰⁷ However, at the end of his

²⁰⁴ Simmons (ed.), (cf. note 43), watermark no. 721, p. 28.

²⁰⁵ Kazimiera Maleczyńska: Dzieje starego papiernictwa śląskiego [The history of the old Silesian paper making]. Wrocław 1974, p. 22.

²⁰⁶ Von Hössle, (cf. note 203), pp. 11f.

²⁰⁷ Fr. von Hössle: Alte Papiermühlen der Provinz Schlesien. In: Der Papier-Fabrikant, H. 31 (1935), p. 262.

article he stated: „Und die letzte Erinnerung an die 300jährige Papiermühle wird wohl der 130 mm breite Ortsname in lateinischer Schrift mit der großen Jahreszahl 1798 bilden“.²⁰⁸ The latter statement suggests 1498 as the year the mill was established. This date seems to be reasonable, as it was approved in analyses of the watermarks visible in the paper of the Silesian manuscript entitled *Frumentorum Parochialis (Schweidnizensis) ab A^o 1471 ad A^o 1507*, written at Schweidnitz in Latin and German between 1471-1507. The greater part of the manuscript is written on Italian paper, mainly from the Brescia region, with characteristic watermarks depicting a bull's head with some additions. In this manuscript the first local paper, manufactured in the Schweidnitz mill, was found as dated on 1499.²⁰⁹ Its watermark, depicting the boar, an element of the coat of arms of this town, is shown here in Fig.32. It is rather hard to assume that the costly paper of Italy was still in use after local manufacture of paper by hand was started in this town, and therefore 1498 is a reasonable date of establishing this papermill, keeping in mind the results gained in investigations into paper stock of the Silesian manuscript *Frumentorum Parochialis*, written in Schweidnitz, in which the first local watermark is dated 1499.



Fig.32: The earliest (dated 1499) watermark (reduced) of the medieval papermill at Świdnica (formerly Schweidnitz, also known as Svídnice) found by Ważyńska and Dąbrowski (cf. note 209) in a manuscript written in this town within the years 1471-1507.

The papermill was active in Schweidnitz until 1757, with some interruptions, and it was later built in the vicinity of this town, where paper was made by hand

²⁰⁸ Fr. von Hössle: Alte Papiermühlen der Provinz Schlesien. In: Der Papier-Fabrikant, H. 32 (1935), pp. 269ff.

²⁰⁹ Joanna Ważyńska, Józef Dąbrowski: Średniowieczny śląski rękopis kościelny cennym źródłem filigranów [The medieval Silesian church manuscript as the valuable source of watermarks]. In: Przegląd Papierniczy, 54 (1998), pp. 403-406, 423-424; watermark no. 27.

until machine papermaking was introduced. According to the description of grades and prices from 1771, about 2540 reams of paper were manufactured in this mill.²¹⁰ Paper from the Schweidnitz mill was exported to Scandinavia.²¹¹

In the above-mentioned Silesian manuscript *Frumentorū Parochialis*, paper made in Neisse (now Nysa, also known as Nisa) was also present, with a characteristic watermark depicting ‘fleur-de-lis’ without shield, and dated 1503 (see Fig.33).²¹² The town of Neisse was owned by the Breslau Chapter, whose emblem became the coat of arms of Neisse: three fleurs-de-lis (two above one) in the shield.



Fig.33: The earliest (dated 1503) known watermark (reduced) of the papermill in Nysa (formerly Neisse, also known as Nisa) found by Ważyńska and Dąbrowski (cf. note 209) in a manuscript written in Schweidnitz within the years 1471-1507.

The municipal papermill in Nysa was probably built before 1500, and paper was manufactured in this mill until the Thirty Years’ War; however, after the war there is a lack of information about its further activities. Making paper in this town is again mentioned in 1737 and in 1764.²¹³

In Ohlau (now Oława) a papermill was established before 1576. After that year the mill was shortly owned by Herzog Georg von Schlesien. Its watermarks depict the shield charged with a cock. The cock (‘Ohlauer Hahn’) represented the arms of this town. The mill was rebuilt after the fire in 1634. According to

²¹⁰ Von Hössle, (cf. note 208), p. 271.

²¹¹ Lindberg, (cf. note 3), watermark no. 655 (1571), p. A 194.

²¹² Ważyńska/Dąbrowski, (cf. note 209), watermark no. 34.

²¹³ Maleczyńska, (cf. note 205), p. 150.

the description of grades and prices (1771), 2350 reams of paper were yearly manufactured in this mill.²¹⁴

In the opinion of von Hössle, perhaps two papermills were active in the town of Brieg (now Brzeg). Von Hössle remembered the watermark depicting the arms of the principality of Brieg (Fürstentum Brieg), known to Briquet (from 1549 to 1599).²¹⁵ This kind of watermark was published also by Labarre in eleven variants dated from 1601 to 1659.²¹⁶ Von Hössle reproduced two other watermarks depicting the arms of the town of Brieg, the shield with three-shanked anchor.²¹⁷ Lindberg found this kind of watermark in Finnish archives.²¹⁸

The exact date of founding a papermill in Ratibor (now Racibórz) remains unknown, and the watermark of this mill found by Briquet in a manuscript dated 1497 (his no. 952) seemed to be the earliest one. In the opinion of Maleczyńska, there is a lack of information about activities of this papermill in the seventeenth century; however, the mill is again mentioned in the second half of the eighteenth century. Most likely, it was finally stopped before 1846.²¹⁹

A relic of great value is the old Silesian paper mill which structure from 1605 has fortunately survived at Duszniki (formerly Reinerz, also known as Dušniky). Since 1968, the mill has housed the Museum of Papermaking (see Fig.34) in which also paper is made by hand.²²⁰

²¹⁴ Friedrich von Hössle: *Alte Papiermühlen der Provinz Schlesien*. In: *Der Papier-Fabrikant*, H. 5 (1935), pp. 38f.

²¹⁵ *Ibid.*, Abb. 12.

²¹⁶ Emile J. Labarre (ed.): *The Nostitz Papers*. Hilversum 1956, watermark nos. 386-396, pp. 73f.

²¹⁷ Von Hössle, (cf. note 214), p. 39, Abb. 13 (1566-1581), Abb. 14 (1572).

²¹⁸ Lindberg, (cf. note 3), watermark no. 68 (1569), p. A 155.

²¹⁹ Maleczyńska, (cf. note 205), p. 151.

²²⁰ Muzeum Papiernictwa w Dusznikach Zdroju, <http://www.muzpap.pl> [in Polish, German, English, and Czech].



Fig.34: The Museum of Papermaking in the old Silesian paper mill at Duszniki (formerly Reinerz, also known as Dušniky), photograph taken by the author in 2006.

The first unquestionable information about this papermill is dated: 24 August 1562; when Nicolaus Kretschmer of Saxony bought this mill from another owner. Gregor Kretschmer erected the mill again in 1605 after the great flood in 1601, which had destroyed the former buildings. In 1709 an additional mill was built by papermakers in Reinerz, although only to stock preparation for papermaking, and without any preparation for moulding paper. In 1771 the manufacture of 289 bales, i.e. 2890 reams of paper, was reported. The Reinerz papermill was noted for the fineness and permanence of its paper. In 1905 the cylinder paper machine was installed there. Saint Peter, the patron of the town of Reinerz who is depicted with the large key in the coat of arms of this town, was frequently presented in watermarks of the hand-made papers manufactured in the Reinerz mill, (see Fig.35).²²¹

²²¹ Gottfried Schweitzer: 450 Jahre Papiermacherei in Reinerz/Duszniki. IPH Congress Book, Vol. 15 (2004), pp. 9-17.



Fig.35: Watermark (reduced) of the papermill in Reinerz (now Duszniki, also known as Dušniky) dated 1739, after Schweizer (cf. note 221).

It should be remembered that Emperor Rudolf II granted a coat of arms to Gregor Kretschmer and his brother Georg, in the privilege (*Wappenbrief*) issued in 1607 at Praha. However, this was not the granting of a noble title.²²² Nevertheless, according to Czech sources, Emperor Rudolf II granted the nobility to Gregor and Georg Kretschmers and their descendants on 9 August 1612 in Praha.²²³

Papermaking in Lower Silesia started when Lower Silesia was subordinate to the Kingdom of Bohemia, ruled by the Kings of the Jagiellon House (from 1471 to 1526). From 1526 to 1741, the Habsburgs were rulers of the Kingdom of Bohemia, of which Lower Silesia was a part. The wars in the seventeenth and eighteenth centuries were disastrous for that region, especially the Thirty Years' War, which was afflicting Silesia in 1626. However, papermaking in Silesia recovered in the second half of the eighteenth century under Prussian government (from 1741), and in 1800 at least 56 papermills were active in Prussian Silesia.²²⁴

²²² Mieczysława Chmielewska: Arms document of the Duszniki papermakers, brothers Gregor and Georg Kretschmer, dated 13th August 1607. IPH Congress Book, Vol. 15 (2004), pp. 87-92.

²²³ A. Rybička: O rodině Krčmářů z Schenkenberku a K. z Schenkendorfu [About the Kretschmer families of Schenkenberk and of Schenkendorf]. Památky archeologické. Příspěvky genealogické, VIII (1868-1869), pp. 617f.

²²⁴ Maleczyńska (cf. note 205), pp. 114-117.

Making paper by hand in the southern part of Central and Eastern Europe

Traditionally, the beginning of papermaking in the Czech Republic is associated with the written message present in the Royal Register of Vladislav II the Jagiellon, King of Bohemia, as an extract of the draft document dated 24 May 1499 in Buda, in which the King granted a permission for papermaking to the Abbot of Cistercian monastery in Zbraslav (Königsaal), now within the boundaries of Praha. In the opinion of the King, miller Jan of that monastery “should not sell or export the old clothes for paper-making but buy them and manufacture paper from them for the common use in Czech lands”.²²⁵ However, there is a lack of any further confirmation of so early papermaking in Zbraslav. Nevertheless, the quick development of papermaking in the historical Czech Lands is observed almost from the very beginning of the sixteenth century, and this fact is documented in publications by Zuman²²⁶, as well as by Eineder, the latter author used German names.²²⁷ The data selected from these publications are quoted below. At present, the Czech Republic is divided into 13 regions; however, the traditional names are still used in cultural history and other specific texts, including Bohemia, Moravia, and Silesia, altogether regarded as the historical Czech Lands.

In the opinion of Zuman, among documented sixteenth-century papermills in Bohemia, the earliest one was established in Trutnov (Trautenau), in the northern part of Bohemia, where making paper by hand was started before 1505, as in this year activities of the Trutnov papermill were the first time mentioned in the historical source. Bartel Fetscher of Ravensburg is recorded in 1533 as a papermaker in the Trutnov mill. His follower, Hans Fetscher, rebuilt (1558) the

²²⁵ 500 let výroby papíru v českých zemích [500 years of the manufacture of paper in the Czech Lands]. Svaz Průmyslu Papíru a Celulózy. Praha 1999, p. 4.

²²⁶ František Zuman: PAPIR, historie řemesla a výrobní techniky [PAPER, a history of the craft and its productive technique – edited with additional material by Miroslav Vykydal]. Nové Město nad Metují 1983, pp. 42-71.

²²⁷ Eineder, (cf. note 171).

mill destroyed by fire in 1557. The flood seriously damaged the mill in 1570, and it became inactive until 1580. Benedikt Frey, a new owner of the mill, restarted papermaking there, and after that, in 1581, he leased the mill to Andreas Schmidt. The mill was active almost to the middle of the nineteenth century. In Fig.36, an example of the watermark with the Trutnov arms is shown, according to Labarre.²²⁸

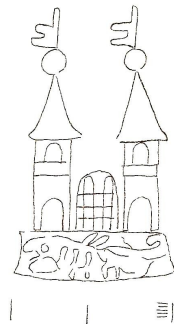


Fig.36: Watermark (reduced) of the papermill in Trautenau (now Trutnov) dated 1641, after Labarre (cf. note 216).

The second paper mill in Bohemia was established before 1516 in Frýdlandt (Friedland), located north-west of the town of Trutnov, where hand papermaking was continued until the second half of the nineteenth century. In 1527, according to the sources, Gallus Treu is the owner of the Frýdlandt mill. Most likely, this papermaker is identical with Gallo Trew mentioned in Kraków, in the Latin document dated 23 August 1538, together with ten Kraków papermakers, masters and companions.²²⁹ According to Zuman, before Gallus Treu a certain Claudio is mentioned in 1517 in the sources as the papermaker in Praha who supplied paper to Lorenz Kune, a maker of playing cards in Leipzig, Germany. However, in the opinion of Zuman, Claudio was probably involved in supplying paper and other goods from Italy (like some other Italians in Praha) not in the craft of papermaking.²³⁰ Undoubtedly, the capital city of Praha was an important centre of hand papermaking in Bohemia; however, the exact date of establishing a paper mill in the city (in the old town area, in Czech ‘Staré Město’) remains

²²⁸ Labarre (cf. note 216), p. 63, watermark no. 304.

²²⁹ Ptašník, (cf. note 95), document no. 411, pp. 160f.

²³⁰ Zuman, (cf. note 226), p. 55.

unknown. The earliest known watermark of the mill active in Praha - Staré Město is dated 1524, and the mill is mentioned in the local archive in 1534, with Hans Frey from Reutlingen as an owner of this mill. Dominik, a papermaker in this mill, is earlier mentioned among local burghers, in 1530.²³¹ Two watermarks of this mill, from the time of Hans Frey (who died about 1555), are shown in Fig.37, after Eineder.²³²

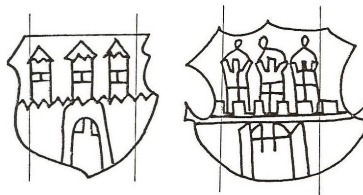


Fig.37: Two watermarks (reduced) of the first papermill active in Prague (Praha - Staré Město) dated 1542 (left) and 1543 (right), after Eineder (cf. note 171).

This first papermill in Praha was destroyed in 1648, and after rebuilding it was active (with interruptions) until 1861.²³³ Also during the Swedish siege (1648), two other papermills in this area were destroyed which, however, were not rebuilt. Pavel Lutter, an apprentice in the first papermill in Praha - Staré Město operated at that time by Fridrich Frey, established the second papermill in this area, before 1597.²³⁴ The third papermill, a short-lived one, was established before 1638 by Samuel Petschek on the large island (Štvanice) in the vicinity of Praha - Staré Město.²³⁵ Some other papermills established before 1800 within the boundaries of today's Praha should be recalled. A papermill in Nové Město (Prague-Neustadt), a suburb of Praha, was established in the first half of the eighteenth century; however, the mill was burnt down in 1775.²³⁶ The first papermill in Libeň (Liben) was built about 1530 by Petr Osovský, and the watermark of this mill dated 1570 is known, depicting the arms of the Bryknar

²³¹ Ibid.

²³² Eineder, (cf. note 171), watermarks no. 405 and 408, p. XV.

²³³ Ibid., p. 127.

²³⁴ Zuman, (cf. note 226), pp. 57f.

²³⁵ Ibid., p. 72.

²³⁶ Ibid., p. 78.

family.²³⁷ The second paper mill in Libeň was established (about 1549) by Hans Frey, known to us from the first papermill in Praha, and this second mill at Liben was active almost until the mid-nineteenth century.²³⁸

It was once again Hans Frey who founded (1540) the papermill in the Bohemian village of Staré Hory near the Moravian town of Jihlava; in German accounts the papermill is denoted as Altenberg-Iglau (or Iglau-Altenberg).²³⁹ An example of its watermark depicting the arms of the town of Jihlava (Iglau) is shown (Fig.38).²⁴⁰

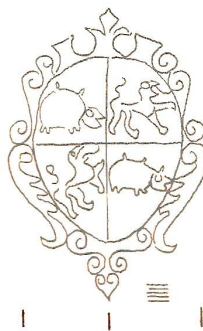


Fig.38: Watermark (reduced) of the papermill at Staré Hory near Jihlava (Altenberg-Iglau) dated 1642, after Labarre (cf. note 216).

Paper was made by hand in this mill until 1860. Emperor Rudolf II granted (1591) the privilege to Benedikt Frey, the papermaker and owner of the papermill in Staré Hory, for operating the printing shop at Jihlava to print school handbooks in Czech, German, and Latin.²⁴¹ This papermill was well known for the fineness of its paper, and in 1842 the Royal and Imperial licence for the entire country was granted to this mill.²⁴² Its founder, Hans Frey, is generally regarded as the inventor who introduced (1541) the water-powered hammer to glazing paper, eliminating in this way the polishing of paper with stone; according to such statement published by Eineder.²⁴³ Nonetheless, this invention does not have any confirmation in archive-records of Bohemia and Moravia, as

²³⁷ Ibid., pp. 51f.

²³⁸ Eineder, (cf. note 171), p. 123.

²³⁹ Zuman, (cf. note 226), pp. 58ff.

²⁴⁰ Labarre, (cf. note 216), p. 53, watermark no. 234.

²⁴¹ Zuman, (cf. note 226), p. 60.

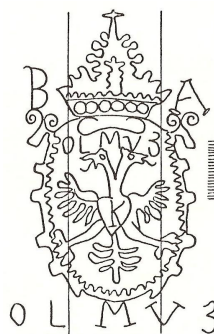
²⁴² Eineder, (cf. note 171), p. 138.

²⁴³ Ibid., p. 133.

well as in the productive technique applied in Bohemian and Moravian paper mills. Earliest remarks written in inventories of those paper mills about the water-powered glazing hammer are dated 1671 in Pardubice (Pardubitz) and 1714 in Frýdlandt (Friedland).²⁴⁴

Examples of other long-active papermills established in Bohemia in the sixteenth century should be presented, according to Zuman.²⁴⁵ Starting from the west, in Cheb (Eger), a papermill was founded in 1540, and at the end of the sixteenth century, papermills were established in Jáchymov (Horní Žďar, Joachimstal) and in Chomutov (Komotau). Near the latter place, two papermills were founded in Jirkov (Görkau or Jörkau) in the second half of the sixteenth century, and the first of them was still active in 1845. Further to the north-west, in Ústí nad Labem (Aussig), a papermill was built in 1559, and ten years after that date, papermills were established in the nearby town of Benešov nad Ploučnicí (Bensen or Beneschau), and further to the north, in Dolní Poustevna, the latter town was known in German as Nieder-Einsiedel or Einsiedel (Nieder). In southern Bohemia, the first paper mill was started in Český Krumlov (Krumau), shortly before 1572.

In Moravia, the first papermill was erected in Olomouc (Olmütz), about 1505, and paper was made by hand there (with interruptions) almost to the end of the eighteenth century (Fig.39).²⁴⁶



²⁴⁴ Zuman, (cf. note 226), p. 141.

²⁴⁵ Ibid., pp. 43, 46, 48, 49, 51, 53, 63.

²⁴⁶ Ibid., p. 66, Obr. 10 (897)

Fig.39: Watermark (reduced) of the Olomouc (Olmütz) papermill found by Briquet (his no. 897) in a manuscript dated 1577; after Zuman (cf. note 226).

Before 1517, a papermill was founded in Brno (Brünn) on the land owned by the Augustinian monastery, and the mill was active until the siege of the town by Swedish troops in 1645. Later on, the Brno mill was rebuilt, and making paper by hand was continued until machine papermaking was started there.²⁴⁷ In the second half of the sixteenth century, papermills were established in Litovel (Littau), Šumperk (Schimberg or Mährisch Schönberg), Beranov, Bolíkov (Wölking), Velké Losiny (Groß Ullersdorf), and Třebíč (Trebitsch).²⁴⁸

The earliest known watermark of the Velké Losiny (Groß Ullersdorf) papermill depicts the coat of arms of the founder of this mill, i.e., Jan the Younger of Žerotín (1545-1608), of the Moravian aristocracy, who transferred Velké Losiny into an administrative centre of the Žerotín dominion, with the late Renaissance castle completed in 1589. The watermark dated 1596, is shown here in Fig.40, after Sedláček.²⁴⁹

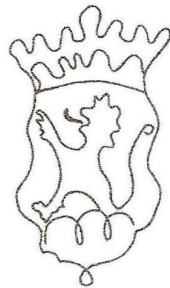


Fig.40: The earliest known watermark (reduced) of the papermill at Velké Losiny/Groß Ullersdorf, found in a manuscript dated 1596, according to Sedláček (cf. note 249).

Johann Amos Komenský, an eminent thinker and progressive pedagogue internationally known as Comenius, should be remembered here. Born in Moravia (1592), Comenius had to leave his country (1628) as a priest of the

²⁴⁷ Ibid., p. 65.

²⁴⁸ Ibid., pp. 65, 69f.

²⁴⁹ Richard Sedláček: *Vergangenheit und Gegenwart der Papiermanufaktur in Velké Losiny/Groß Ullersdorf – vier Jahrhunderte ununterbrochene Produktionstradition (1596-2004)*. IPH Congress Book, Vol. 15 (2004), pp. 81-86. [Tracing of the watermark dated 1596 is shown in p. 86; however, the date of this watermark is erroneously written as 1592 – JD]

Bohemian Brethren. Karel the Elder of Žerotín supported Comenius as long as this was possible in Moravia.²⁵⁰ According to Voorn, Comenius spent some time also in Velké Losiny, visiting the papermill and using its paper.²⁵¹ Comenius lived most of his life in foreign countries, in Poland, Sweden, Hungary, and (after 1656) in Holland, in Amsterdam, where he died in 1670. The most popular (and the best known) book by Comenius was *Orbis sensualium pictus* [The visible world], composed during his stay in Hungary (Sárospatak, 1650-54) and published first time in Germany (Nuremberg, 1658), in a bi-lingual (Latin and German) version. The second edition appeared there in 1659, and it was reprinted in 1660. [The latter was quite recently republished in a digitized version, together with translations and comments in Czech and English languages.²⁵²] The book had an enormous success and was repeatedly reprinted, often with other languages; however, always with the Latin text. In the book, short descriptions are given which are related to various aspects of daily life, and most of these descriptions are illustrated, as the book was intended for the use in schools to teach foreign languages to children. The book is of significance also for European paper-history, as presenting one of earliest pictures depicting (in rather highly simplified woodcut) a European papermaker at work. Schulte presented remarks on this picture, discussing editions of the book published in various countries.²⁵³ Siniarska-Czaplicka²⁵⁴ recalled Silesian edition of *Orbis sensualium pictus* (Bregae Silesiorum, 1667), in Latin, French, German, and Polish (Fig.41).

²⁵⁰ František Hýbl: Karel the Elder of Žerotín and Comenius. In: Cour d'honneur 1 (1998), pp. 17f.

²⁵¹ Henk Voorn: Czechoslovakia. In: Handmade papers of the world. A publication commemorating the 80th anniversary of the foundation of Takeo Co., Ltd. Tokyo 1979, pp. 83f.

²⁵² Ludovít Emanuel, Marcela Desortová: Digitization of Early Printed Books of J.A. Comenius ORBIS SENSUALIUM PICTUS. Praha 1999.

²⁵³ Toni Schulte: Zur ältesten Darstellung eines Rührwerkes. In: Papiergeschichte 7 (1957), pp. 75-80.

²⁵⁴ Jadwiga Siniarska-Czaplicka: Hasło „papier“ w XVII-wiecznej encyklopedii [The entry „paper“ in the seventeenth-century encyclopaedia]. In: Przegląd Papierniczy 32 (1976), pp. 271f.

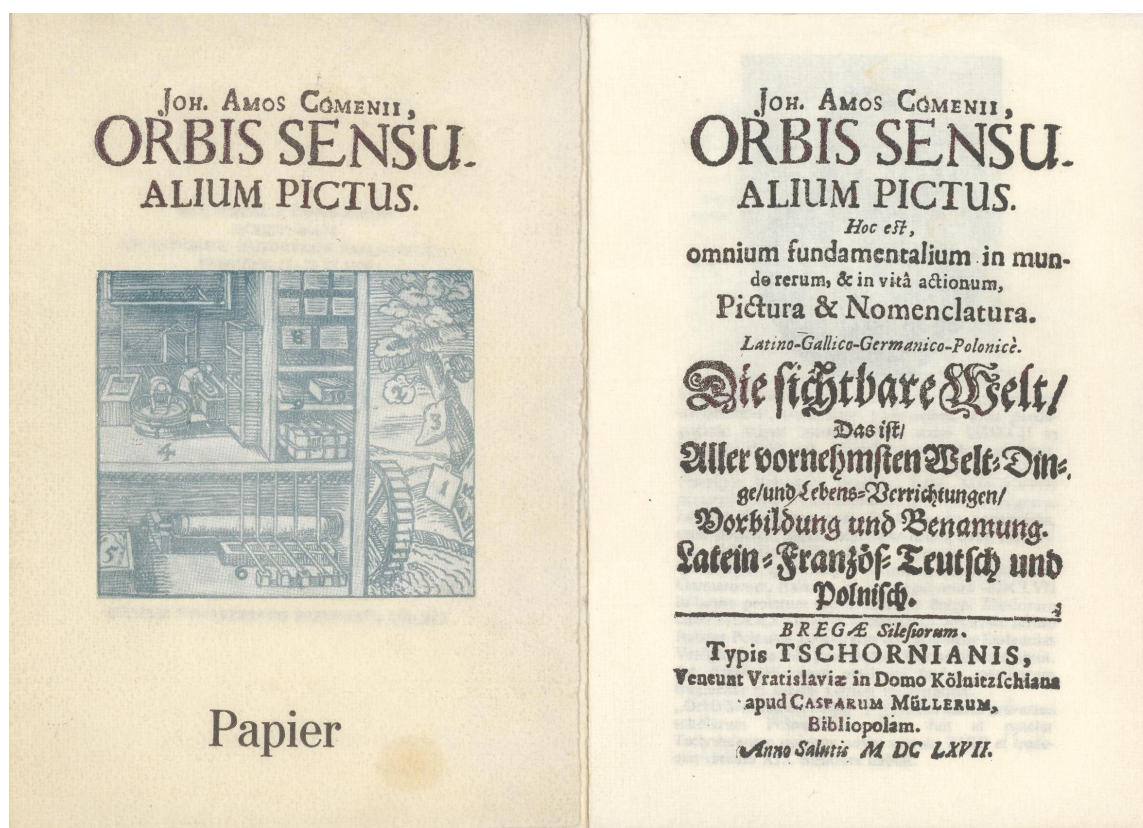


Fig.41: Two pages from Jadwiga Siniarska-Czaplicka's bibliophile edition of 1976.

Turning to the history of papermaking in the Czech Republic. In this part of Silesia which belongs to the Czech Republic, the first papermill was built shortly before 1507 in Opava (Troppau). In historical sources the mill is first time mentioned in that year, in the privilege given on 5 March 1507 at Kraków by Sigismund I the Old, King of Poland, as the Duke of Opava. The earliest known watermark of this mill, depicting the Opava arms, was found in a manuscript dated 1510.²⁵⁵ The Opava papermill was active until 1865, without longer interruptions.²⁵⁶ From 1740, this part of Silesia was known as Austrian Silesia. Papermakers of Bohemia were also frequently involved in the operating of the mill in Dušníky (Reinerz, Duszniki), as this part of Silesia was subordinate to the Kingdom of Bohemia until 1740.

²⁵⁵ Zuman, (cf. note 226), p. 70.

²⁵⁶ Vladimír Gerolt: Filigrány staré opavské papírny [Watermarks of the ancient papermill at Opava]. In: Papír a celulóza, Vol. 13 (1958), nr 8, pp. 181ff.

In the sixteenth century, 22 paper mills were active in the historical Czech Lands. Further development of papermaking was continued until the Thirty Years' War, which reduced the paper output. After the recovery, the destruction caused by the wars within the years 1740-1748 and 1756-1763 had to be repaired. The technology and manufacturing experience were brought about into Czech Lands by German masters, who successfully cooperated with local craftsmen in these lands with plentiful streams with clean water and abundant in the raw materials for papermaking. An important progress was associated with introducing the Hollander beater for stock preparation, initiated in Bohemian mills as early as in 1710 (Benešov nad Ploučnicí), and in Moravian mills as early as in 1729 (Velké Losiny).²⁵⁷ So early applying the Hollander beater in Czech papermaking gave the papermaking craft in Czech Lands a big advantage over other craftsmen in the discussed region of Europe. The papermills operated in the historical Czech Lands were significant producers of paper in Central and Eastern Europe, especially in the seventeenth and eighteenth centuries, as well as at the beginning of the nineteenth century. Almost 130 papermills were operated in 1799 in the historical Czech Lands. Their production of paper amounted to 114650 reams in Bohemia, 45860 reams in Moravia, and 13430 reams in Silesia. Altogether, almost 174 thousand (173940 to be precise) reams of paper were made by hand in 1799 in the papermills active in Czech Lands.²⁵⁸ Paper from these mills was not only consumed locally but was also exported to neighbouring lands, to Silesia and Poland; however, it was mainly sold within the Austrian Empire, which territory was enlarged after the Partitions of the Polish-Lithuanian State. In the album published by Matsiuk, watermarks of the Bohemian mill at Svídnice (Swidnitz) are especially frequent, dated within the years 1794-1826, with countermarks SWIDNITZ or SWITNITZ, and sometimes with the initials IR or the name I RITSCHHELL.²⁵⁹ The export of paper directed

²⁵⁷ Zuman, (cf. note 226), p. 121.

²⁵⁸ *Ibid.*, p. 86.

²⁵⁹ Matsiuk, (cf. note 156), watermarks nos.: 12, 16, 17, 18, 57, 83, 84, 85, 86, 537, 544, 546, 582, 592, 593.

to the north-west is also recorded in Czech sources, mainly to the German States, as well as to Holland (especially from the Jáchymov mill) where this paper was thereafter sold with a profit as a Dutch product.²⁶⁰ Quite recently, Lindberg proved that paper from Bohemian mills was exported to Finland, at the end of the sixteenth century and in the second half of the seventeenth century. Examples of the Bohemian watermarks which Lindberg found in the paper extant in Finnish archives²⁶¹ are shown (Fig.42).

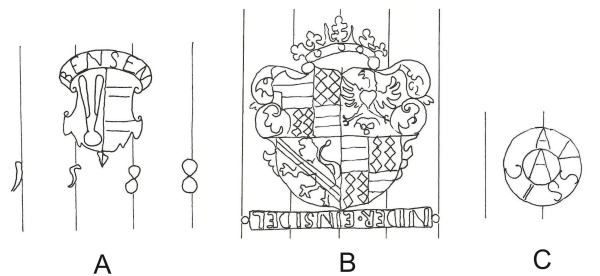


Fig.42: Watermarks (reduced) of the Bohemian mills found by Lindberg (cf. note 3) in Finnish archives; from the left: a) Benešov nad Ploučnicí (Bensen), dated 1589; b) Dolní Poustevna (Nieder-Einsiedel), dated 1665; c) Ústí nad Labem (Aussig), dated 1667

A long tradition of making a high-quality paper by hand in Czech Lands is maintained in the Moravian mill at Velké Losiny. There can be no doubt that the Velké Losiny mill is the oldest handmade papermill in Europe with an unbroken tradition of the regular manufacturing of hand-made paper from long-fibred pulps, in accordance with the old European practice.²⁶² The Museum of Paper is currently housed in one of two main buildings of the mill, and the museum is subordinate to this handmade papermill in Velké Losiny²⁶³, see Fig.43.

²⁶⁰ Zuman, (cf. note 226), p. 180.

²⁶¹ Lindberg, (cf. note 3), watermarks nos.: 60, 118, 619.

²⁶² Sedláček, (cf. note 249).

²⁶³ Handmade paper mill Velke Losiny. <http://www.rucnipapirna.cz> [in Czech & English].



Fig.43: A view of the Velké Losiny handmade papermill; photograph reproduced with permission from Ruční papírna Velké Losiny a.s.

The first papermill on the territory of today's Slovakia was established before 1530 in Levoča (in Hungarian Lőcse, in German Leutschau). It was the first papermill in the Kingdom of Hungary. We do not know the exact date of the foundation of this mill, which starts the papermaking tradition respected both by Hungarian²⁶⁴ and Slovak²⁶⁵ paper historians. Bogdán and Decker, present the same information about the papermill, which was burnt down on 24 November 1530 during the siege of this town, according to the chronicle written (within the years 1516-1536) by Conrad Sperrfogel (or Konrád Sperfogel), a citizen of Leutschau. However, Sperrfogel applied foreign papers (French and German), not the products of the local mill in Lőcse, as the basis of his manuscript. Moreover, a fire destroyed a greater part of Levoča in 1550, together with the town hall and the entire archive. Bogdán believed that Polish papermakers had started making paper in Lőcse, a town situated in the Hungarian part of the historical region of Szepes (in Slovak Spiš, in German Zips, in Polish Spisz), keeping in mind so early development of papermaking in the nearby Kraków area, as well as Polish part of Spisz in the close vicinity of Lőcse. In 1412, King

²⁶⁴ Bogdán, (cf. note 62), pp. 31-35.

²⁶⁵ Decker, (cf. note 63), p. 35.

Sigismund of Luxembourg pawned the part of the Zips area to King Ladislaus II Jagiellon for the sum equalled to about 7.5 tons of pure silver. Later on King Sigismund I the Old organised the district in Polish part of Spisz, being the authorities until the annexation of this area (1769) by Austrian troops.

The quick development of papermaking in the territory of nowadays Slovakia is observed almost from the very beginning of the seventeenth century. The history of papermaking in Slovakia was elaborated by Bogdán within the frame of his extensive history of papermaking in the Kingdom of Hungary, published in 1963. This was of significance for the progress of further studies by Decker, who, in his book published in 1982, supplemented the history of papermaking in Slovakia with the results of his own investigations and with 1240 tracings (reduced) of the watermarks applied in the papermills active on the territory of nowadays Slovakia. Decker frequently informs in his book about the results gained earlier by Bogdán, considering the history of hand papermaking in Slovakia as the common heritage of the Slovaks and the Hungarians. The data selected from these publications are quoted below. In the monograph by Bogdán, the condensed recapitulation of his information about the papermills ²⁶⁶ is supplemented with two maps.

Ten papermills were established in the Spiš area before 1800, such as: Spišská Teplica (Teplic, Teplitz) in 1613, Poprad 1 (Veľká, Felka, Völk, Wielka) in 1633, Nižné Ružbachy (Alsóruzbach, Unter-Rauschenbach) in 1633, Vyšné Ružbachy (Felsőruzbach, Ober-Rauschenbach) in 1644, Spišská Nová Ves (Igló, Neudorf, Nowa Wieś) in 1675, Poprad 2 (Poprád, Deutschendorf) in 1693, Veľký Slavkov (Felsőszálok, Großschlagendorf) in 1696, Podolíneec (Podolinc, Pudlein, Podoliniec) in 1697, Spišské Vluchy (Olaszi, Wallendorf, Spiskie Włochy) in 1785, Gelnica (Gölnic, Gölnitz) in 1791. For two mills, Podolíneec and Gelnica, their further history is unknown, and the Felsőszálok mill was

²⁶⁶ Bogdán, (cf. note 62), pp. 158-225.

active until 1785; however, the rest of the above-mentioned papermills were active until the middle of the nineteenth century. Many papermakers who had practised this craft in the Spiš mills, later on established (or operated) papermills in other parts of Slovakia.²⁶⁷

Benedikt Matavovský, a papermaker who had started his work at Spišská Teplica in 1669, bought this mill in 1673. His skilfully made papers, permanent and durable, are still of high brightness. King Leopold I granted the nobility to him in 1697. In the same year, the King ordered the organisation of one guild for book merchants and printers of books together with papermakers, and appointed Matavovský the senior of the guild. Matavovský ran the Teplic mill until his death, in 1716 (Fig.44).²⁶⁸ After that his nephew, Ľudovít Matavovský, operated the papermill.²⁶⁹

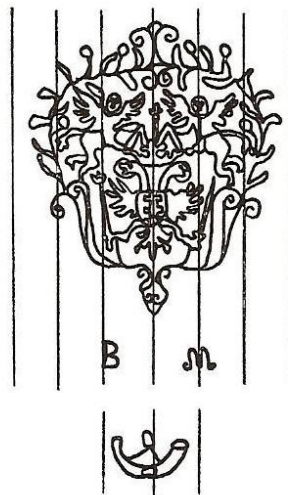


Fig.44: Watermark (reduced) of the papermill in Spišská Teplica (Teplic, Teplitz) with the initials of Benedikt Matavovský; according to Decker (cf. note 63, watermark no. 1131 ab).

Papers of higher quality were also made in the second mill in Poprad (Poprád, Deutschendorf);²⁷⁰ the Polish name of the town is the same as Slovak. However, the best paper in the Spiš area was manufactured in two mills at Ružbachy. In comparison with their products, paper from the Spišská Nová Ves mill was a bit

²⁶⁷ Decker, (cf. note 63), pp. 35-43.

²⁶⁸ Ibid., p. 207, watermark no. 1131 ab.

²⁶⁹ Ibid., pp. 35f.

²⁷⁰ Viliam Decker: Dzieje papierni w Popradzie [A story of the papermill in Poprad]. In: Przegląd Papierniczy 13 (1957), pp. 181-184.

lower quality.²⁷¹ The latter mill frequently used watermarks with its Hungarian name: IGLO; however, sometimes the watermarks with the inscription IGLAU, denoting the Iglau-Altenberg mill in Czech Lands, were (erroneously) classified as the watermarks of the Igló mill.

Liptovský Michal (west of Poprad) is the town where the second papermill in Slovakia was established, in 1596 or 1600 (also mentioned in paper-historical studies as: Liptoszentmihály, Liptó, Némethylpese, Lupča, and Nemecká Lupča). From 1693, the mill had been owned for hundred years by the Zima (Zimányi) family. Within the years 1720-73, papermakers of the Stampor family ran this mill. The mill was active up to the middle of the nineteenth century; but a higher quality paper was made there only in the seventeenth and eighteenth centuries.²⁷²

In Tisovec (south of Liptovský Michal), a papermill was built in 1663 by an unknown papermaker who was provided with financial support from the Kubinyi family. This family retained the ownership of the mill at Tiszolc (now Tisovec, also known as Theissholtz) until the 1840s. In the opinion of Decker, master Pavol Kramer was involved in operating this mill earlier than 1768, as given by Bogdán regarding master Pál Kromer.²⁷³ In 1759, Kramer participated, as the master in the Tisovec papermill, in the convention organised by the master papermakers of the Spiš area. Moreover, this mill was rebuilt (or renewed) by Kramer in 1767.²⁷⁴ In 1772, master Jozef Lenner (Lanner) followed Kramer. J. Lenner the younger ran this mill until 1820, continuing the manufacture of a high quality paper.²⁷⁵

In the nearby Muráň (Murány, Murányfalva, Unter-Muran) a papermill was probably founded before the end of the seventeenth century; however, there is a lack of the source information. Many details about this mill are known from the second half of the eighteenth century, connected with activities of master Jozef

²⁷¹ Ibid., (cf. note 63), pp. 40ff.

²⁷² Bogdán, (cf. note 62), p. 192. Decker, (cf. note 63), p. 29.

²⁷³ Bogdán, (cf. note 62), p. 221.

²⁷⁴ Decker, (cf. note 63), pp. 19f.

²⁷⁵ Ibid.

František Lenner (1777-1803), companion Martin Vozník who in 1778 went to Ružomberok (Rózsahegy, Rosenberg) papermill, and master Matej (Mátyás) Potamka (1808-1829). The mill manufactured yearly about 1200 reams of various kinds of writing and printing papers, together with some absorbent and packaging papers. Writing papers of a high quality were manufactured there almost to the middle of the eighteenth century.²⁷⁶

According to Bogdán, the first papermill in Dobsina (now Dobšiná, also known as Topschau) was established in 1686 by master János Czieser, and the mill was owned by papermakers of the Czieser family up to 1806.²⁷⁷ In the opinion of Decker, there is a lack of information about activities of this mill after 1723, when the mill was visited by F.E. Brückmann, a German physician and naturalist, who purchased asbestos paper manufactured in Dobšiná from fibrous asbestos (started probably about 1700). Later on, Brückmann described the manufacture of the asbestos paper in his book on geology.²⁷⁸ Earlier attempts of making paper from asbestos were reported (1684) in England as unsuccessful. Brückmann published his book in two volumes (Braunschweig, 1727-30), a few copies of which were printed on the paper made of asbestos, the first use of asbestos for this purpose.²⁷⁹ However, activities of the second mill in Dobšiná were more important for manufacturing writing and printing papers. Following the studies by Bogdán, Decker believed that the second mill had been built in Dobšiná (probably) before 1715, by Jan Zieser, the son of Jakub Zieser from Poprad. The Zieser family retained the ownership of the second mill in Dobšiná until 1810. They made a high quality paper; however, papers made at that time in the nearby mill at Muráň were better.²⁸⁰

Long-active papermills were established by members of the Pálffy family in their properties in the vicinity of Pozsony (now Bratislava, also known as

²⁷⁶ Ibid., pp. 20f.

²⁷⁷ Bogdán, (cf. note 62), p. 169.

²⁷⁸ Decker, (cf. note 63), p. 21.

²⁷⁹ Hunter, (cf. note 9), pp. 312, 316, 486, 609.

²⁸⁰ Decker, (cf. note 63), pp. 21f.

Preßburg), and the coat of arms of this powerful Hungarian family was a leading motif of the watermarks applied in these mills, as long as the Pálffy family owned the mills (Fig.45).²⁸¹ They were noted for the fineness of their products. In Pezinok (Bazin, Bösing) a papermill was founded in 1620. It was active until 1866; however, many details of its history remained unknown. In 1680, master Michal Wetzel operated this mill.²⁸²



Fig.45: Watermark (reduced) of the papermill at Bazin (now Pezinok, also known as Bösing) with the Pálffy arms, dated 1673, according to Bogdán (cf. note 62).

In the opinion of Decker, the next papermill in the property of the Pálffy family was founded in Častá (Cseszte, Píla, Vöröskő, Satmansdorf, Bibersburg) in 1675, and the mill was active until 1891. In 1755, master Ignác Ludwig ran this mill, manufacturing paper of high brightness.²⁸³ However, according to Bogdán, there were two separated papermills working in so close vicinity, at Cseszte and in Píla (Vöröskő), which were driven by the same stream called Gidra. Nevertheless, Bogdán was able to present historical information only about that papermill, which was active (in his opinion) at Píla (Vöröskő).²⁸⁴ Not so far from these locations, there was a similar case regarding the papermill in Borinka (Borostyánkő or Pozsonyi Borostyánkő, Ballenstein, Pajštún) and in Stupava (Stomfa, Stampfen). According to Bogdán, there were two separated mills, both driven by the same stream called Morava; however, there was a lack of

²⁸¹ Bogdán, (cf. note 62), pp. 160f, Fig. 22.

²⁸² Decker, (cf. note 63), pp. 15f.

²⁸³ Decker, (cf. note 63), pp. 16f.

²⁸⁴ Bogdán, (cf. note 62), pp. 167, 208ff.

information about the Stomfa mill.²⁸⁵ In the opinion of Decker, there was only one mill (at Borinka) but differently called, which was founded at the end of the seventeenth century by members of the Pálffy family. Ján Ecker is mentioned in 1757 as the papermaker running this mill.²⁸⁶

Examples of the long-active papermills founded in other parts of Slovakia in the seventeenth century should be recalled. In Košice (Kassa, Cashau), a papermill was established in 1640. The mill was active also in the second half of the nineteenth century. However, the quality of its products was not so high owing to water shortages for driving three waterwheels of this mill.²⁸⁷ In Sabinov (north of Prešov), a papermill was established in 1644; however, probably the second mill, which was established in Sabinov (Kisszeben, Zeben), continued activities of the first one. According to Decker, the third papermill in this town was started in 1803.²⁸⁸ In the opinion of Bogdán, there was only one papermill in Kisszeben, founded in 1644 and active also in the second half of the nineteenth century.²⁸⁹ In the nearby Zborov (Zboro, Makovica), a papermill was established in 1651, and initially (until 1697) the Rákóczi family owned the mill. According to Decker, the mill was burnt down in 1883 or 1884.²⁹⁰ There is a lack of detailed information about a papermill in Prešov (Eperjes, Eperies), and Bogdán believed that the Eperjes mill had been active only within the years 1697-1714.²⁹¹

In Kremnica (west of Banská Bystrica), a papermill was founded before 1610, according to so early watermarks depicting a part of the arms of this town, recalled by Decker.²⁹² In the opinion of Bogdán, however, the first papermill in Körmöc (now Kremnica, also known as Kremnitz) was established in 1625. In the eighteenth century the mill was equipped with the Hollander beater and two

²⁸⁵ *Ibid.*, pp. 164, 217.

²⁸⁶ Decker, (cf. note 62), p. 17.

²⁸⁷ *Ibid.*, pp. 12ff.

²⁸⁸ *Ibid.*, p. 44.

²⁸⁹ Bogdán, (cf. note 62), p. 182.

²⁹⁰ Decker, (cf. note 63), p. 45.

²⁹¹ Bogdán, (cf. note 62), p. 172.

²⁹² Decker, (cf. note 63), pp. 47f.

vats.²⁹³ Two papermills were founded in Slovenská Ľupča (east of Banská Bystrica), known also as Zólyolimpce. In the opinion of Bogdán, the first papermill in this town started its activity in 1711, and the second one in 1783.²⁹⁴ Further studies by Decker corrected these dates, the first mill was active as early as in 1697, and the second mill, sometimes called Driekyňa, was built in 1788. In both mills papermaking machines were installed in the second half of the nineteenth century.²⁹⁵

Two papermills were also established in Kláštor pod Znievom (north of Kremnica, in the vicinity of the town of Martin), both in 1656, in this location known in paper-history also as Znióváralja. Bogdán added the question mark to his information about the establishing of both papermills by the University Printing House at Nagyszombat (Tyrnau), now Trnava.²⁹⁶ However, Decker approved this fact in his studies, supplementing the history of these mills with further details. Both mills were located on the ground owned by the Jesuit College, on banks of the stream called Vrica. The controversy between the University Printing House and the Jesuit College was solved in 1708. The upper mill remained a property of the University Printing House and the lower mill became a property of the Jesuit College.²⁹⁷ The latter, denoted by Bogdán as Znióváralja 2, and by Decker as Kláštor pod Znievom 1, was active until 1773; however, in the upper mill (Znióváralja 1, or Kláštor pod Znievom 2) the manufacture of paper by hand was continued until 1858. An example of the watermark (with the countermark below it) of the upper mill is shown in Fig. 46, according to Decker.²⁹⁸

²⁹³ Bogdán, (cf. note 62), pp. 188f.

²⁹⁴ Ibid., p. 225.

²⁹⁵ Decker, (cf. note 63), pp. 56ff..

²⁹⁶ Bogdán, (cf. note 62), pp. 223ff.

²⁹⁷ Viliam Decker: Papierne univerzitetnej knižtlačiarne v Trnave [Papermills of the University Printing House in Trnava]. In: Papír a celulóza, Vol. 33 (1978), pp. 29ff.

²⁹⁸ Ibid.,(cf. note 63), p. 138, watermark no. 287 ab.



Fig.46: Watermark (reduced) of the upper papermill at Kláštor pod Znievom (Znióvárálja) depicting the coat of arms of Hungary, with the name of the tenant who ran this mill within the years 1812-21; according to Decker (cf. note 63, watermark no. 287 ab).

In the seventeenth century, 24 papermills were established in territory of today's Slovakia, and 56 in the eighteenth century. Many of them were still active in the nineteenth century, when some new papermills were additionally built.²⁹⁹ The manufacture of hand-made papers in such nineteenth-century papermills was sometimes able to compete successfully with early machine-made papers. The papermill established in 1828 at Harmanec (Hermanec) was equipped with three waterwheels, four Hollander beaters, and six vats (!). The yearly output of this mill was from 12 thousand to 15 thousand reams, or even higher, keeping in mind the consumption of the rags in this mill, within the range from 4 thousand to 5 thousand hundredweight per year. Wove ('velin') papers for writing and printing, together with packaging papers and boards, were made by hand in this mill until 1841, when a paper-making machine was installed there.³⁰⁰

According to Bogdán, the fourth papermill in Kokova (now Kokava) was established (1837) and owned by the Forgách family. In 1839, 8700 reams of hand-made paper, mainly wove paper for writing and printing, were manufactured in this mill equipped with three waterwheels, three Hollander beaters, and three vats.³⁰¹ Decker presented more details about this mill that (in

²⁹⁹ Ibid., p. 61.

³⁰⁰ Ibid., pp. 58-61.

³⁰¹ Bogdán, (cf. note 62), p. 186.

his opinion) was the third papermill in Kokava, established in 1835 by Count Forgách. Its yearly output of paper was finally increased to 11600 reams, after introducing the fourth vat, i.e. to about 42 reams of paper made by hand during each working day. The papermill was known under the Hungarian name the ‘Rima Chorepai papieros-gyár’, which suggested the machine manufacture of paper, in spite of the fact that the mill did not employ any paper machine. Its wove papers were awarded medals at the World Exhibition in Vienna (1873). Such considerable quantities of hand-made paper were successfully manufactured in this mill almost to the end of the nineteenth century.³⁰² These activities proved that the papermaking craft was able to compete with the machine paper-making in the early days of the paper-making machine, when the widths were comparatively narrow, until the fibrous pulps from wood became broadly applied in paper-making, especially that exceptionally cheap mechanical pulp produced by grinding of wood logs, which was invented in Germany (‘Holzschliff’, in English ‘stone groundwood pulp’).

Paper from the mills active on territories of today’s Slovakia was consumed both locally and in other parts of the former Hungary. Later it was also exported to south-eastern parts of Poland, and next to its part annexed by Austria. In the album published by Matsiuk, watermarks of the papermills located in eastern parts of today’s Slovakia are frequently present.³⁰³

On the territory of today’s Hungary papermills started their activities as late as in the eighteenth century, and about fifteen papermills were established during the course of this century. However, the first printing office in Hungary was founded in Buda as early as in 1472/73, under the reign of Mátyás Hunyadi ‘Corvinus’, the son of János Hunyadi, a Hungarian nobleman of Transylvania

³⁰² Decker, (cf. note 63), pp. 24f.

³⁰³ Matsiuk, (cf. note 156), for example: no. 65 (POPRAD, 1783), no. 543 (RUSBACH, 1812), no. 545 (ZBORO, 1819), no. 580 (GOLNIZ, 1789).

who in 1456 had defeated Turkish army at Nándorfehérvár (now Belgrad). The King was known as a collector of the books (the priceless ‘Corviniana’) and a protector of Renaissance art. Under his reign, Andreas Hess printed the famous *Chronica Hungarorum* in 1473 at Buda. There were suggestions about the establishing of the Hungarian papermill in 1470; nonetheless, the books of Andreas Hess had been printed on imported paper.³⁰⁴

It should be recalled that the last independent King of Hungary and Bohemia, Louis II the Jagiellon, was killed in the battle of Mohács (1526) against the Ottoman Turks. The Turkish occupation of the royal seat in Buda (1541) resulted in the Partition of Hungary. Central Hungary became an Ottoman province, Transylvania became a separate principality subordinate to the Ottomans, and western and northern parts of Hungary were subordinate to the Habsburgs. And therefore activities of the Hungarians were earlier concentrated in Upper Hungary, i.e. in Slovakia, and in Transylvania as well. This is a reason for so late propagation of papermaking in the central part that constitutes the today’s Hungary. Some of the results published by Bogdán on the eighteenth-century papermills on this territory active until the mid-nineteenth century are quoted below.

Starting from the north-east, the papermill in Erdőhorváti (west of Sárospatak) manufactured writing papers from 1786.³⁰⁵ In Sajószentpéter (north of Miskolc), a papermill was established before 1725.³⁰⁶ In Csaba (south of Miskolc), the Bárczay family established (about 1741) a papermill.³⁰⁷ North-west of Miskolc, in Dédes (now Dédestapolcsány), the Serényi family founded (before 1787) a papermill.³⁰⁸

³⁰⁴ Bogdán, (cf. note 62), pp. 30f.

³⁰⁵ Bogdán, (cf. note 62), pp. 172f.

³⁰⁶ *Ibid.*, p. 215.

³⁰⁷ *Ibid.*, p. 167.

³⁰⁸ *Ibid.*, pp. 167f.

In the opinion of Bogdán, Sámuel Martinyi, a master papermaker, built in 1802 a papermill in Diósgyőr (now within the frontiers of Miskolc).³⁰⁹ According to the results gained in further studies, the mill was established earlier, in 1782; however, its first dated watermark was of 1802. The Diósgyőr mill was (and still is) noted for the fineness of its papers. The Paper Industry Museum was opened there in 1982, and enlarged in 2002. At present the mill is specialised in the machine manufacture of base papers for bank notes, cheques, documents, etc.³¹⁰ Its papers are also used in publishing bibliophile prints, like the two volumes by the late Lajos Nándor Varga, an eminent Hungarian graphic artist & painter and the lover of watermarks, issued in 1995 to commemorate the hundredth anniversary of his birth. The presentation of the archival material collected in the Museum of Sepsiszentgyörgy, is a highly interesting part of the first volume. That museum was founded in 1879 by Csereyné Zathureczky Emilia. [In Romania, the town is called Sfintu Georghe. During the Second World War, the collection of the museum was badly damaged, and part of it was even destroyed.] The second volume contains the watermarks gathered by Varga. The two volumes show the wood engravings (!) of altogether 835 watermarks, many of them are from the papermills located in the discussed region. They were printed on the watermarked wove paper from the Diósgyőr mill. The leading motif of the watermarks used in this mill is shown in Fig.47, as the wood engraving by Varga.³¹¹



³⁰⁹ Ibid., p. 169.

³¹⁰ Diósgyőri Papírgyár Zrt, <http://www.dipa.hu> .

³¹¹ Lajos N. Varga: *Vízjegyek* [Watermarks]. Budapest 1995, Vol. 2, p. 378, watermark no. 770.

Fig. 47: Watermark (reduced) representing the leading motif of the watermarks used in the Diósgyőr papermill, reproduced as the wood engraving elaborated and published by Varga (cf. note 311).

In Szentendre (north of Budapest), a papermill was established before 1771.³¹² In Sóly, north of Lake Balaton, the Cistercian monastery in Zirc founded (before 1796) a papermill to manufacture writing papers.³¹³ In Pápa, near Veszprém, a papermill was established earlier, before 1729, and the Eszterházy family owned this mill, from 1730.³¹⁴ The aristocratic Hungarian family owned also the papermill in the nearby Igal (founded before 1820).³¹⁵ Koncz gathered more details from the history of the last three papermills, together with 102 tracings (reduced) of watermarks.³¹⁶ The earliest watermark published by Koncz is shown in Fig.48.³¹⁷

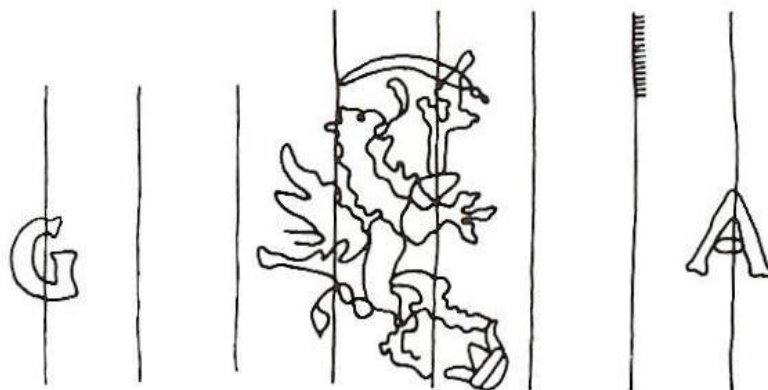


Fig.48: The earliest watermark (much reduced) of the Pápa mill, dated 1737, which was found by Koncz (cf. note 316).

The Eszterházy family established the papermill in Léka (1731); now Lockenhaus in Austria. The mill had been active for more than hundred years, producing writing & printing papers, as well as such a difficult paper product as

³¹² I. Bogdán, op. cit. [67], pp. 218-219.

³¹³ Idem, pp. 215-217.

³¹⁴ Idem, p. 206.

³¹⁵ Idem, p. 180.

³¹⁶ Pál Koncz: Pápa, Igal és Sóly papírmalmai a XVIII-XIX században [The papermills at Pápa, Igal, and Sóly, in the 18th-19th centuries]. Publicationes Museorum Comitatus Veszpremiensis, Vol. 17 (1984), pp. 567-602.

³¹⁷ Idem, p. 579, Table I (p. 583) watermark no. 1.

the music paper for writing and printing the notes. Watermark of this mill is shown in Fig.49.³¹⁸

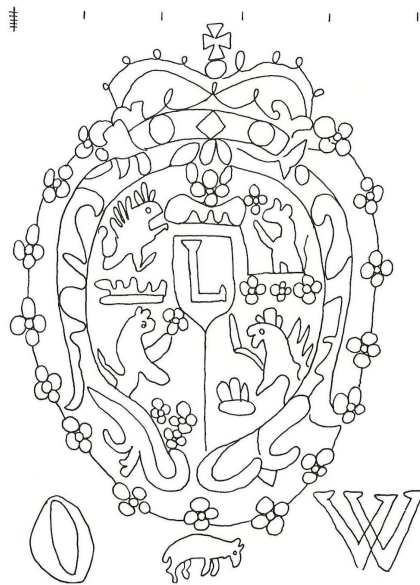


Fig.49: Watermark (much reduced) dated 1780 of the papermill in Léka (now Lockenhaus, in Austria), according to Bogdán (cf. note 62).

Not so far from Léka, there was a papermill in Borostyánkő, now Bernstein in Austria. The mill was established before 1763, and it was active after 1776.³¹⁹

In Pécsvárad (Petschwar) a papermill was founded before 1719. György Klimó, the Bishop of Pécs, established in 1764 a papermill in Pécs (Fünfkirchen). Initial watermarks of this mill used his coat of arms as a motif. The mill was owned by the Bishopric in Pécs until 1820.³²⁰

Earliest papermills in today's Romania were established in the historical region of Transylvania (in Romanian Ardeal or Transilvania, in Hungarian Erdély, and in German Siebenbürgen). Its history is tightly linked also with the history of Hungary, and therefore the tradition of the papermaking art in Transylvania is of significance both to Hungarian and Romanian paper historians. Regarding the first papermill in Transylvania, in the opinion of Bogdán, the 1546 record of Brassó (now Braşov, also known as Kronstadt and as Corona) runs: *In this year*

³¹⁸ Bogdán, (cf. note 62), pp. 190f, Fig. 39.

³¹⁹ Ibid., p. 164.

³²⁰ Ibid., pp. 206ff.

*the first paper was made by Pole of the name Jan, to which this task had been assigned by Jan Fuxen and Jan Benkner, citizens of Brassó. According to this author, the papermaker Jan was known under surname: Früe.*³²¹ However, Mareş proved, that it was Joannes Hokermann, a papermaker from the Balice mill near Kraków, who started making paper by hand in Braşov. The papermill was situated near the stone bridge (Ghimbasel) and the costs of its building were paid by Johannes Benkner and Hans Fuchs. The mill was burnt down during the fights in 1600, and the repeated attempts to reconstruct the papermill remained unsuccessful, as the result of the battles in the vicinity of this town, in 1603 and 1611. Mareş presented eight different watermarks found in papers manufactured in this mill. The first watermark is shown in Fig.50.³²²

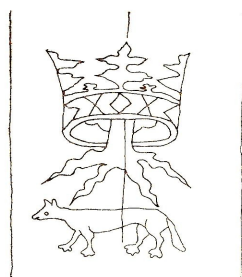


Fig.50: Watermark (reduced) dated 1546 of the papermill in Braşov (Brassó, Kronstadt, Corona) according to Mareş (cf. note 143).

This watermark depicts the arms of the town to which a fox is added; the latter commemorates Hans Fuchs, a co-founder of this mill. Probably, Hokermann applied also the mould taken from Balice, with the watermark depicting a double fluer-de-lis on a crowned shield and with his initials I H beneath the shield. Such watermarked paper, dated 1561 in Suceava, Mareş considered as a product of the Balice mill,³²³ however, this statement could be questioned. According to to Bogdán, the next papermill in Brassó was built before 1735.³²⁴

³²¹ István Bogdán: Historia papiernictwa węgierskiego [A history of Hungarian papermaking]. In: Przegląd Papierniczy 18 (1962), pp. 328f.

³²² Mareş, (cf. note 143), pp. XXI-XXIII, Fig. 10.

³²³ Ibid., pp. XXXII, 35 (watermark no. 1590), 414.

³²⁴ Bogdán, (cf. note 62), p. 166.

The mill was active until the mid-nineteenth century, and examples of its watermarks were published by Varga.³²⁵

Regarding the second sixteenth-century papermill in Transylvania, in the opinion of Bogdán, Gáspár Heltai, a printer in Kolozsvár (Klausenburg, Cluj), now Cluj-Napoca, founded a papermill at this town in 1563.³²⁶ According to Mareş, the town council of Cluj approved (29 December 1560) the place to establish a papermill by Heltai. In 1563, Heltai sent a certain János to Kraków for companions of the papermaking craft to the planned papermill. The exact date of starting the manufacture of paper in this mill remains unknown; however, its first known watermarked paper is dated 29 April 1564. Watermarks of this mill became very rare in archival material after 1602. Most likely, the fights broken out in this area resulted in closing the papermill at Cluj, in November 1601. Mareş presented nine different watermarks of this mill, the last one only with the initials of its founder, G. Heltai.³²⁷ According to Varga, first publication by Heltai in Latin (1550) was followed by books printed by him in Hungarian language. A portrait of Gáspár Heltai and his watermark, artistically elaborated by Varga,³²⁸ are shown in Fig.51.

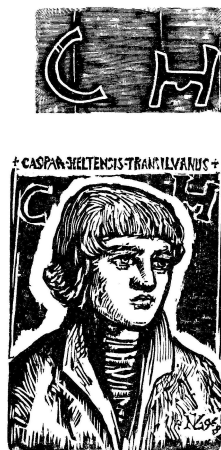


Fig.51: Reproduction (reduced) of Gáspár Heltai's portrait and his watermark, artistically elaborated by Varga (cf. note 311).

³²⁵ Varga, (cf. note 311), Vol. 1, pp. 196-198, 207, 219-221, 229-231, 248; Vol. 2, pp. 329-337.

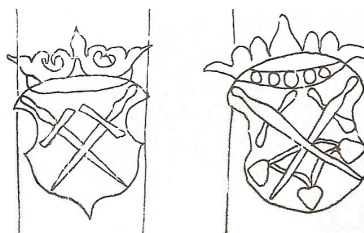
³²⁶ Bogdán, (cf. note (62), p. 188.

³²⁷ Mareş, (cf. note 143), pp. XXIV-XXVII.

³²⁸ Varga, (cf. note 311), Vol. 1, pp. 53f.

According to Bogdán, the Jesuits of Kolozsvár founded (before 1713) the papermill in Kolosmonostor (Kolozs-Monostor, Mănăştur-Cluj); now within the boundaries of Cluj-Napoca. The mill was active until the mid-nineteenth century.³²⁹ Varga published a few watermarks of this mill.³³⁰

The third sixteenth-century papermill in Transylvania, according to Bogdán, was founded in 1573 by the town council of Nagyszeben (now Sibiu, also known as Hermannstadt).³³¹ In the opinion of Mareş, the town council of Sibiu financed the building of a papermill (by Jörg ‘Papiermacher’) as early as in 1555. However, the newly built mill was immediately conveyed to the guild of cloth makers, who returned the expenses to the town council. Stephen Báthory, the first elected Prince of Transylvania [in 1576 elected the King of Poland], granted the privilege to the town, dated 12 March 1573, to build a papermill at the town and to sold its products in Transylvania. The town council appointed Jerg Berger (a German of Reutlingen, called ‘Dracul’, i.e. devil) as supervisor of the building activities. The papermill was built in the nearby village of Tălmăciu (Talmács). The first watermarked paper of this mill, operated by Berger, is dated February 1574. In the opinion of Mareş, the papermill was not active in 1601, and most likely the mill was destroyed during the battle of Şelimbăr (28 October 1599). Mareş presented two watermarks of this mill, both with the coat of arms of the town (Fig. 52). In the second one, used only within the years 1575-78, the emblem is added which was present as a xylographic ornament in the issue of the evangelistary printed (Sibiu 1546) in Old Church Slavic language.³³²



³²⁹ Bogdán, (cf. note 62), p. 188.

³³⁰ Varga, (cf. note 311), Vol. 1, pp. 217f, 227; Vol. 2, pp. 383f.

³³¹ I. Bogdán, op. cit. [67], p. 196.

³³² A. Mareş, op. cit. [121], pp. XXVII-XXVIII, Fig. 29, Fig. 30.

Fig.52: Two watermarks (reduced) of the sixteenth-century papermill in Sibiu (Nagyszeben, Hermannstadt), according to Mareş (cf. note 143).

In the opinion of Bogdán, the town council founded the next papermill at Nagyszeben (now Sibiu) in 1754, and the mill was active until the mid-nineteenth century. Bogdán presented its watermark of 1786.³³³ Varga also published watermarks of this mill.³³⁴ However, the latter author found the sheet of paper, most likely from this mill, dated 12 July 1688 (!).³³⁵

West of this town, in Orlát (now Orlat, also known as Ortenbach), a papermill was established before 1770. Initially, the Royal Treasury owned the mill. Bogdán published its watermark of 1824,³³⁶ and Varga presented a few other examples of watermarks used in this mill.³³⁷ The Royal Treasury owned also a papermill founded (1750) by Count János Haller in Roskány (now Roşcani, also known as Déva), near a brook called Dobra.³³⁸

Turning to the east, three long-active (also in the nineteenth century) papermills were built, according to Bogdán, in Kercesoara (now Cârţisoara, also known as Mühlenbach), Fogaras (now Făgăraş), and Hévíz (now Hoghiz). The latter mill, also known as Oltbogát (in Romanian Bogata Olteană), was established in 1743 by Telekiné Bethlen Kata, and writing papers were watermarked there with the Bethlen arms (Fig.53).³³⁹

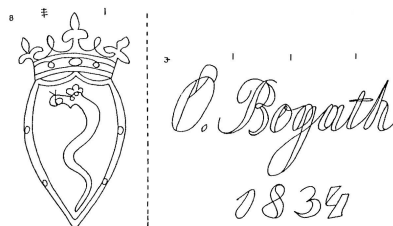


Fig.53: Watermark depicting the Bethlen arms and counter watermark (both reduced) of the papermill in Hévíz (now Hoghiz), according to Bogdán (cf. note 62).

³³³ Bogdán, (cf. note 62), pp. 196ff, Fig. 42.

³³⁴ Varga, (cf. note 311), Vol. 1, pp. 194f, 217, 224; Vol. 2, pp. 338ff.

³³⁵ Ibid., Vol. 1, p. 137, watermark with inscription HERRMANSTADT placed beneath the coat of arms of this town.

³³⁶ Bogdán, (cf. note 62), pp. 203f, Fig. 45.

³³⁷ Varga, (cf. note 311), Vol. 1, pp. 191, 218, 231, 236, 241.

³³⁸ Bogdán, (cf. note 62), pp. 212ff, Fig. 50 with watermark of 1808. Varga, (cf. note 311), Vol. 1, p. 225.

³³⁹ Bogdán, (cf. note 62), pp. 178f, Fig. 33 with watermark of 1834.

The Royal Treasury founded the Fogaras mill before 1732, and writing & printing papers were watermarked there with double-headed eagle and inscriptions FOGARAS or FAGARAS.³⁴⁰ In the opinion of Bogdán, the Teleki family established (before 1710) a papermill in Kercesoara. The coat of arms of the Teleki family was (until 1840) a leading motif of watermarks applied in this mill.³⁴¹ An example of such watermark is shown (Fig.54), according to Varga.³⁴²



Fig.54: Reproduction (much reduced) of the 1809 watermark of the mill in Kercesoara (also known as Mühlenbach) now Cârțișoara, depicting the Teleki arms, artistically elaborated by Varga (cf. note 311).

According to Bogdán, Prince Mihály Apafi (Apaffy) established a papermill in Görgényszentimre (north of Hévíz), before 1660. The mill, known also under names: Görgény, Görgeny, or Gheorgheni - now Gurghiu, was active until the mid-nineteenth century. Initially, watermarks in writing and printing papers of this mill depicted the Apafi arms, later the coat of arms of the Bornemissza family, and finally, inscriptions with the mill's name were applied.³⁴³

³⁴⁰ Ibid., pp. 176f. Varga, (cf. note 311), Vol. 1, pp. 207-210.

³⁴¹ Bogdán, (cf. note 62), p. 182.

³⁴² Varga, (cf. note 311), Vol. 2, p. 317, watermark no. 648 of 1809.

³⁴³ Bogdán, (cf. note 62), p. 177. Varga, (cf. note 311), Vol. 1, pp. 97, 119, 203.

In Romanian principality of Moldavia (now divided between Romania, Moldavia, and Ukraine) papers with watermarks depicting the Moldavia arms were used in the second half of the sixteenth century and in the first half of the seventeenth century. While discussing the document written in Moldavia on such paper by Voievodul Petru Șchiopul on 4 August 1583, Dîmboiu recalled suggestions about the beginning of making paper by hand in Moldavia at that time, probably in the vicinity of Baia. However, this was never documented.³⁴⁴ Mareș presents one variant of that watermark, found by him in the documents dated within the years 1582-1591, which is reproduced here in Fig.55. Knowing information from Poland, Mareș considered the Polish provenance of these watermarks.³⁴⁵

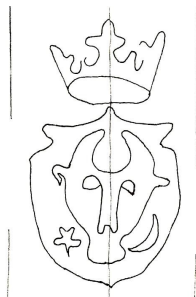


Fig.55: Watermark (reduced) depicting the coat of arms of Moldavia, present in papers of Polish provenance found by Mareș (cf. note 143) in the archives at Iași, in the documents dated from 1582 to 1591.

In Romanian principality of Wallachia, now in Romania, the papermaking craft was started in the first half of the seventeenth century. Dîmboiu recalled such papermills established at Govora and in Călimănești. In his opinion, also Palatine Matei Basarab founded (1640) a papermill in the vicinity of Tîrgoviște or near Cîmpulung. Information about this mill was published in the printed pamphlet (Cîmpulung 1643) by Chancellor Udriște (Orest) Năsturel. More papermills, called there ‘harturgii’, were established later on, in the next century. In 1768, paper was manufactured in such mill at Fierbinți, on the river of Colentina, near București. In Fig.56, watermarks of papermills working at

³⁴⁴ Aurel Dîmboiu: *De la piatră la hîrtie* [From stone to paper]. București 1964, pp. 303f.

³⁴⁵ Mareș, (cf. note 143), pp. XX-XXI, XXIX, 60 (watermark no. 319), 390.

Govora and in Călimănești are reproduced, after Dîmboiu.³⁴⁶ Both watermarks depict the Eagle of Wallachia. Such watermarked paper of the Călimănești mill is visible in the Wallachian edition of Thomas á Kempis, printed at the Deal monastery.³⁴⁷

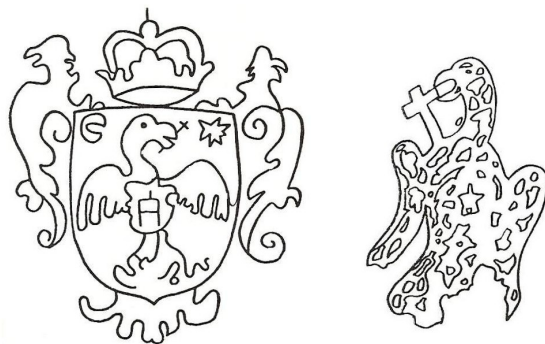


Fig.56: Watermarks (reduced) of the Govora papermill (left, dated 1638) and of the Călimănești mill (right, dated 1642), after Dîmboiu (cf. note 344).

On the territory of today's Croatia, making paper by hand was started in only one mill. In the opinion of Bogdán, this papermill with one vat was established in 1771 at Novavilla (near Záhgráb).³⁴⁸ According to further studies, this papermill in Nova Ves near Zagreb (Neudörfl bei Agram) was active from 1772 to 1825.³⁴⁹

Hand papermaking was better developed in Slovenia. While presenting new results gained in the studies on papermills at Loka and in Goričane, Cafuta³⁵⁰ recalled papermills established in Slovenia, as well as earlier investigations into this issue done by Šorn.³⁵¹ There were eight papermills before 1800, and the first of them was active within the years 1580-96 at Zgornja Hrušica (Birnbaum) in the Studenec (Kaltenbrunn) estate, near Ljubljana (Laibach). The village of Zg.

³⁴⁶ Dîmboiu, (cf. note 344), pp. 312f.

³⁴⁷ Simmons (ed.), (cf. note 43), p. 37, watermark nos.: 1796, 1797.

³⁴⁸ Bogdán, (cf. note 62), p. 201.

³⁴⁹ Information kindly sent by Darko Cafuta, according to Andrija L. Lisac: Razvoj industrije papira u Zagrebu [Development of the paper industry at Zagreb]. Zagreb 1961.

³⁵⁰ Darko Cafuta: The History of the Loka Paper Mill and the Beginnings of the Goričane Paper Mill. In: IPH Congress Book, Vol. 12 (1998), pp. 20-29.

³⁵¹ Jože Šorn: Ältere Papiermühlen in Slowenien. In: Papiergeschichte 6 (1956), pp. 40ff.

Hrušica was also called Gorenja Hrušica (Oberbirnbaum), now within the frontiers of Ljubljana. This first papermill was founded by Janž Kisl (Khisl, or Khisel). Šorn supposed supplying with its paper the printing office at Ljubljana.³⁵² However, recent investigations by Cafuta into the papers to be found in the books published within the years 1580-96 in Ljubljana proved a lack in their paper stock the paper made in the first Slovene mill.³⁵³

South-west from the city of Ljubljana, two papermills were established, first of them was active within the years 1669-94 at Vipava (Wippach) estate, and the second one was run in Ajdovščina (Aidusina, Haidenschaft) from 1767 to 1829. The latter was the biggest papermill in Slovenia, with an output of 7000 reams of paper a year. It was established by Tomaž Kumar, a Slovene entrepreneur who wrote his name also as Thomas Cumar, or Kumer. High quality papers manufactured in this mill were successfully exported, among them also the so-called ‘Blaues holländisches Papier’ used for packaging sugar.³⁵⁴ West from this mill, in Podgora near Gorica (Podgora bei Görz), a papermill was founded in 1789; now in Italy as Potgora near Gorizia, at the frontier with Slovenia. Hand-made paper was produced there until starting machine papermaking, in 1859. An example of the watermark of the Ajdovščina mill is shown in Fig.57, according to Šorn.³⁵⁵

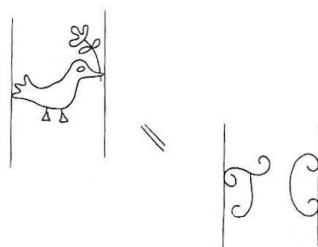


Fig.57: Watermark (reduced) dated 1769 of the papermill in Ajdovščina (formerly also known as Aidusina, or Haidenschaft) with the initials of its founder (and owner) in counter watermark, after Šorn (cf. note 351).

³⁵² Ibid., p. 40.

³⁵³ Information kindly sent by Darko Cafuta.

³⁵⁴ Šorn, (cf. note 351), p. 42.

³⁵⁵ Ibid., Abb. 8.

The longest manufacture of paper by hand in Slovenia was carried out in the mill at Žužemberk (south-east of Ljubljana), in German called Seisenberg. In the opinion of Šorn, the mill was established in 1716 by Anton Nickel. He manufactured yearly 1500 reams of paper, which was also sold in neighbouring countries. The Kleinmayr family of the book printers from Ljubljana became an owner of the mill in 1792. Thank to their investments the papermill in Seisenberg was enlarged and modernized.³⁵⁶ However, according to the newest results gained in the investigation by Cafuta, Thomas Kraidl built this papermill in 1701, and the mill was active until 1870. The widow Kraidl married Anton Nickel on 29 July 1721. The Kleinmayr family became a co-owner of this mill in 1788.³⁵⁷

Not so far from this mill, at Njivice near Radeče (Niviz bei Ratschach), in the Radeče (Ratschach) estate, a papermill was built that was driven by the river of Sopota. Making paper by hand was continued there until introducing a papermaking machine, in 1854. The mill was established before 1 April 1723, the date of the earliest known watermark of this mill.³⁵⁸

Two small papermills were built near the town of Škofja Loka (north-west of Ljubljana), in German Bischoflak. Cafuta proved that first of them, in the estate of Loka (Lak), was active from 1740 to 1785. Shortly after closing this mill, the second one was established (1788) in Ladja near Medvode (Ladia), in the estate of Goričane (Görtschach).³⁵⁹ In 1865 the mill was burnt down. After its rebuilding the manufacture of stone groundwood was started and thereafter, in 1872, a paper-making machine was installed there.³⁶⁰

³⁵⁶ *Ibid.*, p. 41.

³⁵⁷ Information kindly sent by D. Cafuta.

³⁵⁸ *Ibid.*

³⁵⁹ Cafuta, (cf. note 350), pp. 22-28.

³⁶⁰ Information kindly sent by D. Cafuta.

An example of the watermark used in the Loka mill, found by Cafuta,³⁶¹ is shown in Fig.58.

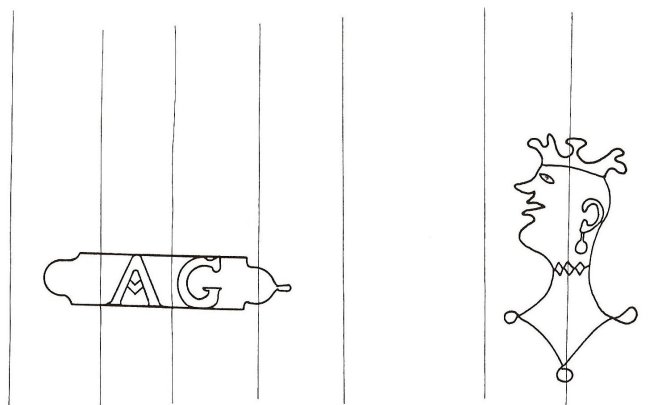


Fig. 58: Watermark (reduced) of the Loka (Lak) mill, with the initials of Anton Grundner, a papermaker in this mill; found by Cafuta (cf. note 350) in a manuscript of 1778.

The initials of a papermaker are supplemented in this watermark with a motif from the coat of arms of Škofja Loka (Bischoflak). History of this town began in 973, when Emperor Otto II granted the territory of Loka to Abraham, the Bishop of Freising in Bavaria. The coat of arms of the Freising district in Bavaria contains the same motif of ‘Freisinger Mohr’ presented in heraldry as ‘rot gekrönter schwarzer Mohrenkopf mit rotem Ohrring’. Later on, the ancient link with Bavaria manifested itself also in Slovene hand papermaking, in involvement of descendants of the families of Bavarian origin, both as founders of papermills and as papermakers, from Kisl, a founder of the first papermill in Slovenia, to Grundner, a papermaker in the Loka mill.

Undoubtedly, the earliest papermill in the discussed region of Europe was established near Constantinople. However, the exact date of the foundation of the mill remains unknown.³⁶² The Ottoman Turks conquered Constantinople in 1453, which after that was renamed İstanbul. According to Kâğıtçı, the suburb with the papermill was called Kâğıthâne, and the same name was given to the

³⁶¹ Cafuta, (cf. note 350), p. 26, Fig. 6.

³⁶² Toni Schulze: Kleine Hinweise zur Papierfabrikation in der Türkei. In: Papiergeschichte 8 (1958), pp. 43-48.

brook, the ancient Vorvisis, flowing into the Golden Horn.³⁶³ The Kâğıthâne mill begins in Turkey the tradition of making paper by hand in accordance with the method developed in Fabriano. In the opinion of Kâğıtçı, initial watermarks applied in this mill depicted a ‘lion’, i.e. the motif that was the ‘trademark’ of imported Venetian paper. The Kâğıthâne mill was eventually stopped during the reign of Sultan Selim (1789-1809).³⁶⁴

The second papermill was established in Turkey at Bursa (Brussa), and first information about activities of that mill was dated 1486. However, the date of its definite closure remains unknown. ‘Three moons’ became a leading motif of the watermarks used in the Bursa mill. In addition, the Kâğıthâne mill followed the manufacture of such watermarked papers. This motif was an emblem of the Turkish fleet of warships. Examples of such watermarks present in the sixteenth-century Turkish papers are shown in Fig.59, after Kâğıtçı.³⁶⁵

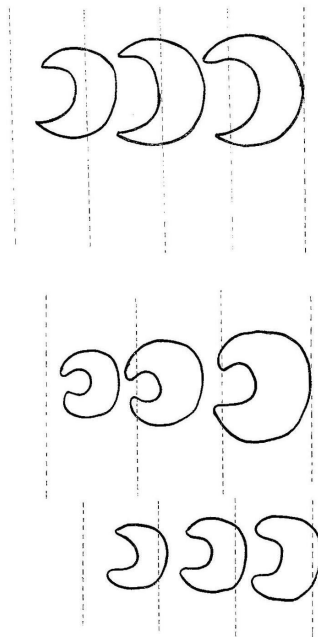


Fig. 59: The sixteenth-century watermarks (much reduced) depicting ‘three moons’, found by Kâğıtçı (cf. note 363) in Turkish papers extant in Turkish archives.

³⁶³ Mehmed Ali Kâğıtçı: Beitrag zur Türkischen Papiergeschichte. In: Papiergeschichte 13 (1963), pp. 37-44.

³⁶⁴ Mehmed Ali Kâğıtçı: Historical Study of Paper Industry in Turkey (In a bi-lingual English and French version. Préface par Prof. Marcel Aribert). İstanbul 1976, pp. 8f.

³⁶⁵ Kâğıtçı, (cf. note 363), p. 41, Abb. 4 (watermarks no. 15).

According to Kâğıtçı, printing was introduced into Turkey in 1732. Such hostile reactions from the calligraphers and copyists forced the Government to protect this new industry. Said Mehmed Çelebi and İbrahim Müteferrika, the pioneers of printing in Turkey, established (1746) a papermill in the village of Elmalık near Yalova (Yalakâbâd) to meet the growing need of paper, and the mill was active until the nineteenth century. At the beginning of its activity, as Kâğıtçı wrote: “İbrahim Müteferrika who was in charge of the future of the mill went to Poland in search of 4 papermakers to improve the production”. Thereafter the papermill became enlarged and better equipped. The quality of its paper, watermarked with a ‘lion’, was comparable to imported paper.³⁶⁶

The growing demand for paper in the Ottoman Empire, it means also in south-eastern Europe subordinate to the Ottoman Empire, was additionally satisfied by papermills in Italy, especially by Venetian mills, which introduced to their watermarks the motif of ‘three moons’, as well as different variants of another motif called ‘crown, crescent, and star’, designed to meet the wishes of the Islamic culture. The latter motif decayed at the end of the eighteenth century, and Mošin and Grozdanovič-Pajič elaborated their interesting typology of such watermarks, giving possibilities for dating handwritings in the Ottoman Empire, within the period from the sixteenth century almost to the end of the eighteenth century.³⁶⁷

However, the watermarks depicting ‘three moons’, usually with additional signs, are perceived even in the nineteenth century. Eineder published examples of these watermarks depicting ‘three moons’ in Italian and Slovene papers, manufactured in the second half of the eighteenth century and in the first half of the nineteenth century.³⁶⁸ In Hungary, a few watermarks of this kind have been published.³⁶⁹ Bogdanov discussed the watermark albums had been published in

³⁶⁶ Kâğıtçı, (cf. note 364), p. 10.

³⁶⁷ Vladimir Mošin, Mira Grozdanovič-Pajič: Das Wasserzeichen “Krone mit Stern und Halbmond”. In: *Papiergeschichte* 13 (1963), pp. 44-52.

³⁶⁸ Eineder, (cf. note 171), Plates: 125-129, 147.

³⁶⁹ Varga, (cf. note 311), Vol. 1, p. 132 (wm. no. 277), Vol. 2, p. 369 (wm. nos. 745, 746).

Bulgaria and in Georgia (in south-western Caucasia), which documented ‘three moons’ as a leading motif of the watermarks visible in papers of studied collections.³⁷⁰ Gaudriault recalled information about the manufacture of such watermarked papers (destined for Levant) in southern France in the eighteenth century, as well as about different sizes (formats) of these papers called: ‘Trois lunes, façon de Venise’, ‘Trois croissants façon de Venise’, ‘Trois croissants’ or ‘Trois lunes’, also ‘Trois croissants alignés verticalement’.³⁷¹ Such watermarked papers are not rare in European archives and libraries, also in these situated on territories which were never subordinate to the Ottoman Empire.

Concluding remarks on hand papermaking in Central and Eastern Europe before introducing paper-making machines

Making paper by hand has been started in the discussed region of Europe comparatively late, towards the end of the fifteenth century, or even later in some areas. At that time, the paper market in Europe was well established and dominated by papers efficiently manufactured in such countries where the papermaking craft had been developed earlier. And this was a difficulty that early papermakers of the countries in Central and Eastern Europe had to contend with, trying to start and develop domestic manufacture of a good paper at a sufficiently low price to compete with foreign papers. The beginnings of papermaking in England show how this task was difficult. Jenkins³⁷² stated: “Tate’s mill, wherever it was situated, must have had a very brief existence as a paper mill; for, so far, there is no evidence whatever that it was at work before 1495 or after 1498.” And further attempts to revive interest in establishing papermaking facilities in England, recalled by Jenkins,³⁷³ were for much of the

³⁷⁰ Bogdanov, (cf. note 58), pp. 56f, 292 (his note no. 93).

³⁷¹ Raymond Gaudriault: *Filigranes et autres caractéristiques des papiers fabriqués en France aux XVIIe et XVIIIe siècles*. CNRS Éditions/J. Telford, Paris 1995, p. 116, watermark nos. 457, 458.

³⁷² Rhys Jenkins: *Paper-making in England, 1495-1788*. Reprinted from the ‘Library Association Record’, 1900-1902. A.A.L. Reprints No. 5. London 1958, p. 3.

³⁷³ *Ibid.*, pp. 4-7.

sixteenth century sporadic and short-lived. In Central and Eastern Europe, however, the art of papermaking was successfully initiated in many places. A lack of political stability and frequent wars in this region of Europe often hindered the progress of the papermaking craft, as was the case with other industries. Nevertheless, there were periods of so highly-developed paper productivity in some areas of the region discussed, documented in this account, that paper was also exported to neighbouring countries, sometimes even to the countries located beyond the region discussed.

The technology and manufacturing experience were brought about into the discussed region mainly by German papermakers who successfully cooperated with local craftsmen. Besides burghers, the noble families and representatives of the clergy were involved to a large degree in founding papermills. Such 'manorial' papermills were later leased or sold to master papermakers. As it was highlighted, the Hungarians were most active in propagating the papermaking craft by establishing numerous papermills on the vast territory of the former Kingdom of Hungary. Paper manufacture by hand was continued almost until to the middle of the nineteenth century, and sometimes even longer, especially in eastern areas of the discussed region, supplying the community with writing and printing papers much more durable and permanent than early machine-made papers.

The heraldic motifs, mainly the coats of arms of noble families, sometimes the arms of cities or towns - are prevalent in the watermarks applied by the mills in the region discussed. Two watermarks had been introduced in this region became later quite frequently used also in papermills located in other parts of Europe. The 'Adler' watermark had been initiated in East Prussia, as the new coat of arms given in 1525 by Sigismund I the Old, was (later on) modified in many variants, especially after a proclamation of the Kingdom in Prussia, in 1700. This 'Adler' watermark was finally applied in papermills located on the

vast territory subordinate to the former Kingdom of Prussia. ‘Three moons’, a leading motif of the watermarks used in Turkish papermill at Bursa (from the sixteenth century), became later applied in many variants by numerous papermills, also by the mills located beyond the discussed region of Europe.

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