

Bonds between Chinese and European paper technology – adaptation and innovation

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Comparative analyses of ancient Chinese and early European paper show much closer relationship than should be expected considering the different look and qualities of the Oriental and Occidental writing materials and tools.

20th century archaeological excavations in China and Central Asia resulted in discoveries of ancient fragments of paper, and my recent analysis of Lou-lan documents has revealed that a mixture of various fibres served as fibre material in the 3rd and 4th centuries. Recycled textile fibres were the dominating material similar to that of later European handmade paper, but the Chinese papermaker's choice of fibres and technology changed during the next 400 years. According to my analyses of paper fragments discovered in Khotan and Dunhuang recycled hemp, flax and ramie fibres were still present together with raw fibres from the Moraceae and Thymelaeaceae families. Fragments of a mixture of pure raw fibres occurred as well and the papermaker's mould and sheet formation technique had developed further.

I have collected data about the ancient Chinese paper production through studies and analyses of paper from Khotan and Dunhuang. 8th century Samarqand paper must have been of similar qualities, when the Arabs learned about the production of the new writing material, hitherto only known from import of Chinese paper to Persia. The preparation of recycled as well as raw plant fibres was used in Samarqand, and the import of Samarqand paper was followed by production of paper in the Occident. However lack of fibre materials similar to those in China resulted in a change from a mixture of raw fibres with addition of recycled fibres to pure recycled textile fibres and the Arab papermakers adopted the Chinese mould with a flexible reed mat. Arab descriptions from the 11th century give conflicting information whether the pulp was couched or poured into the mould as in the floating mould technique used by papermakers in the Himalayas and southern East Asian areas.

The new writing material of recycled textile fibres of hemp and of flax in Egypt rapidly spread in the Arab world. However, heavy starch sizing of the paper and polishing was necessary because of the Occidental writing tools used for parchment and papyrus, and it was this quality of paper that reached Europe in the 12th century.

Very limited written information exists about early European paper production, traditionally well guarded secrets among the papermakers, and study of the paper material is therefore the only way to learn about the technology and fibre material used. Until the analysis of Central Asian paper in the 20th century, very little was known in the western world of the origin of paper. My analysis of European handmade paper reveals the existence of bonds to Chinese papermaking in a common choice of recycled fibre materials, similar methods of dissolving the woven or spun material into single fibres, similar sheet formation in the tameshizuki technique, but another mould construction, transfer technique, drying process and choice of sizing. A mixture of data will be presented describing adaptations and innovations of the technology over a period from the 3rd century until the end of handmade paper production in Europe in the 19th century.