Chinese Turkestan, and their scientific examination, that the fact of the Chinese invention of paper early in the Christian era and its step-by-step migration westward to Europe was firmly established.a

(2) Travel of Paper Westwards

Only after paper was perfected as a writing material and became used in daily life in China, did it spread in all directions throughout the world. Its introduction to other nations occurred in two stages: first by the arrival of paper and paper products, later by the adoption of papermaking methods by that nation. From the available evidence, it seems that at least one to two centuries were required to develop local manufacture after paper products were first introduced. In its westward migration, for example, paper was introduced to the Arab world no later than the 7th century, but its manufacture there was not begun until the 8th century; it reached Europe in the 10th century, but paper mills were not established there until the 12th.

It has often been said that the Chinese kept the secret of their knowledge of papermaking until a few papermakers were captured by Arabs in the 8th century, b but this is certainly not true. c That the westward movement of papermaking was slow was due primarily to China's geographical and cultural separation rather than its secretiveness, for papermaking was learned by China's immediate neighbours as soon as they began to have contact with Chinese culture. The introduction of paper to Korea and Japan in the northeast and to Indo-China in the southeast was early, d even though its migration to the west over the old silk road was slow and gradual. As archaeological evidence shows, the closer a country is to China proper, the earlier is paper to be found there.

The westward migration of paper started with Eastern Turkestan, where it crossed the Chinese border from Tunhuang, perhaps in the 3rd century. In the Loulan region, paper fragments of the 3rd century were found by Sven Hedin and Aurel Stein, and in the Turfan and Kao-chhang area, paper of the 4th and 5th centuries was discovered by Prussian and Japanese expeditions early in the 20th century, and by Chinese excavations in more recent years. In the Khotan area, paper manuscripts in Chinese, Tibetan, Sanskrit, and the ancient Khotan languages, dated as 8th century, were found, also by Stein. e While some of the paper documents may have been brought from China itself to this region, there is evidence that paper was manufactured locally. Among the documents found in

a Cf. Hoernle (1), pp. 663 ff.; also discussions below.

b Cf. Hunter (9), p. 66.

c The theory of Chinese secrecy about papermaking must have been based on the fact that it was a secret early in Europe, where paper-mill owners sometimes required an oath of loyalty of factory workers to guard the secrets of the craft against possible competitors, or applied for a patent for monopoly of raw materials as well as the manufacture of paper; see Hunter (9), pp. 233-4, and discussions on pp. 302 ff. below.

d Cf. below, pp. 319 ff.

e For discoveries of early paper specimens, see Conrady (5), pp. 93, 99, 101; Schindler (4), p. 225; Stein (11), 1, pp. 135, 271; and a summary in Tsien (1), pp. 142-5.
Turfan in 1972, one dated to 620 bears the name of a papermaker, chih-shih Wei Hsien Nu, along with names of administrative officers of Kao-chchang. Again, another piece has a message about sending prisoners to work in paper factories, which must therefore have been operated locally. After studies by Chinese scientists of a score of paper documents discovered in recent years, it is believed that some papers in this region were made locally no later than the beginning of the 5th century. As to the Tibetan manuscripts mentioned earlier, it was learned that the raw fibre is not native to Sinkiang and may have been imported from Tibet.

Paper probably moved farther westwards to the Arab world before the 7th century. Trade and other contacts between Arabs and Chinese furnished opportunities for the Arabs to know paper quite early, and such Arabic words as kagaz for paper and its equivalent girtas, which is found in the Koran, are believed to be of Chinese origin. As early as 650 Chinese paper was imported to Samarkand, but it was a rare article used exclusively for important documents, and it is generally believed that its manufacture in the Arab world was not begun until the middle of the 8th century. It is also said that in the battle on the banks of the Talas River in 751, when the allied Turkic-Tibetan forces routed the Chinese army of Kao Hsien-Chih and captured the prisoners, among them were various craftsmen, including papermakers, who were taken to Samarkand to start paper manufacture. Abundant crops of hemp and flax and the water supply from irrigation canals provided the natural resources for the paper industry at Samarkand, and manufacture grew; not only was the local demand filled, but 'paper of Samarkand' became an important article of commerce.

From Samarkand the paper industry soon passed to Baghdad, where a second paper mill was established by Chinese workmen around 794. As well as a religious and cultural centre of Islam (Fig. 1197), Baghdad was then one of the richest cities of the world, and from this time, paper replaced parchment as the major writing material; the Arabian supply of the European market continued until the 15th century. Another papermaking centre in Western Asia was established at Damascus, which supplied paper known in Europe as charta damascena, as well as products of its other handicrafts, for many centuries. Another Syrian town,

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a Phan Chi-Hsing (10), pp. 137–8, 188.
b Stein (11), 1, p. 426.
c Hirth said the Arabic word kaghid for paper can be traced to the Chinese term ku-chih, paper-mulberry paper. S. Mahdi-Allah (49), pp. 148 ff, says kagaz and girtas are synonymous, meaning paper primarily and document secondarily, and that girtas represents an earlier borrowing.
e While the Arabic source says that paper was brought to Samarkand by Chinese prisoners, the Chinese history records the battle without mention of papermakers as prisoners. In an account by Tu Huan, who was one of the prisoners and who returned to China in 762, he mentioned several names of weavers, gold- and silversmiths, and painters among prisoners, but no papermakers; see his Ching Hsing Chi (HLW), p. 26; tr. Pelliot (32).


Yao Chhungr-Wu (1), p. 82.

1 紙師陳顯奴  2 高仙芝  3 穀紙  4 杜環  5 經行記
Bambyn, also was known for its paper, which was mistakenly thought to have been made of cotton or bombycina.a

Paper migrated from Asia to Africa in the 9th century, and gradually replaced papyrus as the major writing medium. The content of the Rainer collection in Vienna, which includes some 12,500 documents in papyrus and paper, indicates that all documents before +800 were written on papyrus; after that, the later the date the more paper was used.b Towards the end of the 19th century, paper was evidently more popular than papyrus, and was also used for wrapping; rags became treasured as the raw material. Toward the middle of the 10th century, paper entirely displaced papyrus as writing material, as in China it had replaced bamboo and wood since the +3rd century. The northwest coast of Africa became familiar with paper probably in the 9th or 10th century, following the Arab conquest of Morocco, where the capital, Fez, became a centre of papermaking. But Fez lay in the strategic area that marked the struggle between the Arabs and the Spanish, and it was from this region that paper was introduced to Europe.c

Paper could have entered Europe by two different routes: one through Spain, the other by way of Italy. Documentary evidence shows that Spain was the first European country to have it for writing as well as to develop a flourishing paper industry. With the Arab conquest of the Iberian peninsula, paper appeared in

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a The name charta bombycina, paper of Bambyx, was corrupted to charta bombycina, paper of cotton. In 1887 this description was proved incorrect by J. Karabacek and J. Wiesner through scientific analyses.


Spain no later than the 10th century, and a manuscript of the 10th century found in Santo Domingo is said to be one of the earliest examples of paper there; it is made of heavy, long-fibred linen rags and sized with starch, and thus similar to Arabian papers. The Moors introduced its manufacture there, probably early in the 12th century, and one old manuscript dating from 1129 was written on paper as well as parchment; the paper is believed to have been either imported to or made in Spain.\(^a\) The first Spanish paper mills were established in the city of Xàtiva, which was famous for its flax, and an Arab traveller wrote in 1150 that paper manufactured there was better than any from elsewhere in the civilised world; it was sent to both East and West.\(^b\) The early mills were operated by Arabs, but after the Christian conquest by local people, and the first paper factory run by Christians was built in 1157 in Vidalon near the French border. Many Spanish Jews were also skilled in this craft, and after the conquest of the kingdom of Valencia, Jewish papermakers continued to work there, though a tax was levied on their product.\(^c\)

Paper entered Italy not from other European nations but from the Arab world, perhaps from Damascus by way of Constantinople and Sicily. Appearing as early as the 12th century, several old Italian manuscripts still exist which show the early use of paper in Italy, while it is known to have been prohibited for official use in 1221; indeed, a legal ruling in Sicily stated that documents written on paper would have no authority.\(^d\) All paper referred to must have been imported, since none was manufactured locally until more than a century later.

The earliest paper mill known to have been established in Italy is the one at Fabriano in 1268–76, which still continues in operation today. Originally it was a most important source of fine rag paper, and several innovations arose there. Its pulp was made of short fibres thoroughly ground with metal beaters, the paper was sized with an animal glue, and watermarks with crosses and circles were introduced in 1282.\(^e\) All these factors contributed to the excellence of the Fabriano paper, and were soon adopted by other European papermakers, especially at paper mills established in other cities in Italy, which included Bologna (1293), Cividale, Padua, and Genoa. As a result by the time the 14th century had dawned, Italian paper surpassed, in production and quality, that from Spain and Damascus.

In France, paper was probably introduced from neighbouring towns in Spain, for there was a close affinity between the two countries. Spanish paper was used in France at the beginning of the 13th century, but French papermaking started in the 14th, for a mill is known to have been established near Troyes in 1348, and others were set up at Éssonnes, Saint-Pierre, Saint-Cloud, and Toiles between 1354 and 1388.\(^f\) However, a legend relates that Jean Montgolfier was captured by Turks during the second Crusade and put to work at a paper mill, from which he escaped and returned to Europe in 1157. His grandparents, it was said, established several

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\(^a\) Cf. Carter (1), p. 139, n. 11.
\(^b\) Ibid. p. 136, citing a statement by El-Edrisi.
\(^c\) Cf. Blum (1), pp. 28–9.
\(^d\) Ibid. pp. 22–3.
\(^e\) Blum (1), pp. 32; Hunter (9), pp. 301–7.
\(^f\) Blum (1), pp. 32–3.
paper mills at Ambert in the Auvergne, and certainly this became an important centre for papermaking in the middle of the 14th century.\(^a\)

Germany used paper early in the 13th century, mostly imported from Italy, and manufacture was not begun there until the end of the 14th century, when a mill was established by Ulman Stromer (Fig. 1198), who, apparently, had learned the trade from Italians, two of whom collaborated with him in setting up his mill in Nuremberg in 1390.\(^b\) Stromer used the letter S as the watermark of his products, and it was his mill which, in 1391, suffered the first labour strike in the paper industry.\(^c\) It was around this time that the demand for paper increased due to woodblock printing being introduced to Nuremberg, and rose more rapidly still after the introduction of typography in the middle of the next century (Fig. 1199).

In the Netherlands, paper is known to have been used in 1322; the oldest paper found in Dutch archives is dated to 1346 and has been preserved at the Hague.\(^d\) A paper mill is said to have existed in 1428, but the industry was not well established until 1586, when two noted papermakers were authorised to manufacture the

\(^a\) Hunter (9), p. 473; Kagici (1), pp. 7–8.
\(^b\) Blum (1), p. 33.
\(^c\) Hunter (9), p. 234.
\(^d\) Ibid. p. 474.
Fig. 1199. Earliest picture of papermaking in Europe. This woodcut by Jost Amman printed in Frankfurt in +1568 shows tools and processes remarkably similar to those used by early Chinese papermakers, cf. Figs. 1071–2. From Hunter (5).

product near Dordrecht. The Eighty-Years War of 1568–1648 resulted in the migration of many craftsmen to Amsterdam, which had become an international trade centre by the close of the 16th century, and improved paper production after the important invention in +1680 of the Hollander beater for the maceration of
raw materials. Switzerland was content to import most of its paper from Italy and France until the middle of the 15th century, but then the proceedings of Church councils required a large amount of paper for record-keeping, and a paper mill was established in Basel in 1433; many others then followed in the same area, which became a papermaking centre.

In England, paper is known to have been used for written transactions at the beginning of the 14th century, much later than on the continent. It must have been imported, perhaps from Spain, for as late as 1476, the famous early printer William Caxton at first used only papers imported from the Low Countries. However, a paper mill was established before 1495 by John Tate in Hertfordshire, and another by Thomas Thirlby at Fen Ditton in 1557, though the best known of the early mills was the one set up in 1588 at Dartford in Kent, by Sir John Spilman. Spilman was a jeweller to Queen Elizabeth, and he managed to obtain a patent in 1589 that gave him a monopoly throughout the kingdom for collecting all kinds of rags for making white writing paper. Towards the end of the 17th century, some one hundred paper mills were operating in England.

Paper did not reach certain other parts of Europe until the latter part of the 15th century. The first mill in Poland was established in Crakow in 1491, with others in Wilno (1522) and in Warsaw (1534). Paper may have reached Russia early, but the first mill there was not established until 1576, and workmen were recruited from Germany when an extensive mill was set up in 1712. By 1801, there were some twenty-three mills operating in the Russian Empire.

Paper reached the New World probably in company with the early explorers in the late 15th or early 16th century. ‘Paper books doubled together in folds like Spanish cloth’ were mentioned by Juan de Grijalva who arrived in San Juan de Ulua in +1518. These were probably a kind of quasi-paper made by beating fig or mulberry tree bark that had been used by the Mayas and Aztecs for writing. The manufacture of true paper was introduced to America by European papermakers in the latter part of the 16th century, when a twenty-year concession was granted by the Spanish court in +1575 to two papermakers to ‘manufacture paper in New Spain’. In +1580 they set up a mill at Culhuacán near Mexico City, the first to be built on the American continent.

Paper used in colonial America north of Mexico was imported from Europe, mostly from the continent, before being locally manufactured in the late 17th century, when the first mill in northern North America was built in 1690 near Germantown, Philadelphia, by a German immigrant, William Rittenhouse, who had learned the craft in his native country. Only two years after his arrival in Philadelphia Rittenhouse, with a group of others in the German settlement, started paper manufacture. At the beginning of the 18th century two other mills were

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*b* Ibid. p. 476.  
*c* Ibid. p. 480.  
*d* Ibid. p. 484.  
*e* Ibid. p. 477.  
*g* See the expedition of Juan de Grijalva in Diaz del Castillo (1), Eng. tr. A. P. Mandslay, 1, p. 162.  
*h* See discussion of huon and anamal in Hunter (9), pp. 25–9.  
*i* Ibid. p. 479.
established in Pennsylvania: one in 1710 by William de Wees, a relative of Rittenhouse who probably learned the craft at his mill; another, the Ivy Mill, in 1729 by Thomas Willcox, an English immigrant, at Chester Creek near Philadelphia. Many workers from Willcox’s mill later established their own mills for the manufacture of paper in neighbouring areas.

The paper produced at the Ivy Mill supplied the growing printing and publishing activities in Pennsylvania and New York. One of those much involved with it was Benjamin Franklin, who though primarily a printer was also interested in the development of the American paper industry and in improving papermaking methods. He presented an essay on this subject, criticising the European method of making large sheets of paper by pasting small sheets together and burnishing the joints with an agate or flint. He described the Chinese manner of making sheets as large as twenty feet by six feet, by two workmen, who dried these upon the flat, inclined sides of a heated kiln, making a remarkably smooth surface. After a detailed description of the Chinese method, Franklin concluded: ‘Thus the great sheet is obtained, smooth and sized, and a number of the European operations saved.’

In Canada, paper was imported primarily from the United States and Europe, before its first paper mill was established in 1803 at St Andrews, Quebec, by Walter Ware from Massachusetts. A little later, another was built in 1819 by R. A. Holland at Bedford Basin, near Halifax, the increasing need for large quantities of paper for printing newspapers probably being the incentive for this local production of paper. This was true, too, in Australia, where the first paper mill was established near Melbourne in 1868. By this time, papermaking had completed its journey from China to every corner of the world.

3) Introduction of Printing to the West

The travel of paper from China westwards to Europe by way of the Arab world can be traced step by step, but the spread of printing, on the other hand, is not so clear. Such information available indicates that it might have taken the same route to the West overland by way of the silk road or by sea, though at a much later date than paper. Printing appeared in Central and Western Asia as well as in Africa before it was known in Europe, while printed matter, including playing cards, printed textiles, woodcuts, and books printed from woodblocks, is known to have existed in Europe before Gutenberg. Although no direct relationship has yet been established between European typography and Chinese printing, a number of theories in favour of the Chinese origin of the European techniques have been advanced. Some of them are based on early references, others on the circumstantial evidence

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\[a\] See Hunter (9), pp. 274–6.

\[b\] ‘Description of the process to be observed in making large sheets of paper in the Chinese manner, with one smooth surface,’ in Transactions of the American Philosophical Society (Philadelphia, 1793), pp. 8–10.

\[c\] Hunter (9), pp. 526, 539.

\[d\] Hunter (9), p. 568.
that close contact between the East and West, especially during the Mongol conquest, provided a Chinese background for the European invention of typography.

In a way similar to the migration of paper to the West, printing probably first crossed the northwestern border of China to reach Eastern Turkestan. This region, known as Turfan, was occupied by Turkic people from the +6th century and came under Chinese domination a hundred years later. In the middle of the +8th century, however, the area was conquered by the Uighurs, a Turkic tribe, which established an empire that lasted almost five hundred years, until they submitted to the Mongols at the beginning of the 13th century. During the Uighur period, Turfan was a place where many religions and cultures mingled, as discoveries by Prussian, Japanese and Chinese expeditions during this century of documents in seventeen different languages, and other cultural relics testify. The documents found are mostly religious texts and commercial papers, including many examples of blockprinting in Uighur, Chinese, Sanskrit, Tangut, Tibetan, and Mongol, and correspond to the languages found in the Tunhuang documents.

The Uighur prints are all translations of Buddhist works in the Sogdian alphabet with occasional introductory matter by Uighur scholars. What is so interesting is that some of the books have titles and page numbers in Chinese characters (Fig. 1200), indicating that the blocks must have been carved or printed by Chinese craftsmen who used the characters for identification in handling and binding. The Chinese books also are Buddhist sutras printed in large characters and bound mostly in the folded format, with some in rolls as was the fashion in China. A Sanskrit sutra in Lantsa script, probably from the +13th century, has been found too; it is in the pothi form with two long, narrow sheets pasted together. Also included are Tibetan charms contained in hollow clay Buddhist figures, Mongol prints in the ‘Phags-pa script, woodcut pictures, and some materials in the Tangut language. The Tangut people established an empire from the +11th through to the early +13th century in northwestern China, bordering Turfan, and used both blocks and movable type extensively for printing. Both movable-type prints in Uighur and block-printing from the Turfan area have also been discovered on other occasions. The Chinese expeditions in 1928–30 found three additional printed fragments of Buddhist texts in Chinese, two of which are written on the back of the paper in the Uighur language and bear a Chinese seal in red. Also a font of several hundred wooden type for the Uighur language (Fig. 1201), dating to about +1300, was discovered in Tunhuang. This shows that

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a The items found by Albert Grunwedel and Albert von LeCoq of the Prussian group in the Turfan basin in 1902–7 were kept in the Museum für Völkerkunde, Berlin, and are said to have been partly destroyed during World War II. For a more detailed description of documents from the Turfan region, see von LeCoq (1), p. 62; Carter (1), pp. 141–6; Huang Wen-Pi (2).

b For the Tangut printing, see Goodrich (29), pp. 64–5; also pp. 169 ff. above.

c The Chinese findings are included in a report by Huang Wen-Pi (2).

d The Uighur type were found by Paul Pelliot in 1907; cf. Carter (1), pp. 146–7, 218. A recent report says the set can no longer be located.
conversion from block printing to movable type is natural for an alphabetic language such as Uighur, and not only European languages.

The introduction of printing farther to the west was probably accomplished by the Uighurs during the Mongol period. After the Mongol conquest of Turfan, a great number of Uighurs were recruited into the Mongol army; Uighur scholars served as Mongol brains, and Uighur culture became the initial basis of Mongol power. If there was any connection in the spread of printing between Asia and the West, the Uighurs who used both block printing and movable type had good opportunities to play an important role in this introduction.

The Mongol conquests incorporated Persia into an empire of which the capital was in China. Thus the Chinese cultural impact on Persia was manifest during the middle of the 13th and the early part of the 14th century. It was here that printing in China was first reported in literary works and was first used in western Asia. As is generally known, paper money was printed in Tabriz in 1294, exactly following the Chinese system, and even the Chinese word *chiao*¹ for money was adopted, and subsequently incorporated, into the Persian vocabulary.⁰ Although this monetary system did not last long in Persia, the wood carvers who had been employed for the enterprise may have been engaged in printing other material not known to us.

The earliest description of the methods of Chinese printing in any literature was given by a Persian scholar-official, Rashid-eddin, prime minister under the Mongol ruler Ghazan Khan, who took ten years, from 1301 to 1311, to complete a history of the world, that included a description of the reproduction and distribution of Chinese books. Rashid said that when any book was desired, a copy was made by a skilful calligrapher on tablets and carefully corrected by proof-readers whose names were inscribed on the back of the tablets. The letters were then cut out

*See Laufer (1), pp. 559–60.


¹ See Laufer (1), pp. 559–60.
Fig. 1200. Printing in non-Chinese languages, c. +1300, found in Turfan, bears features in Chinese. (a) Buddhist text in Sanskrit but titles and collation in Chinese characters on the right side. (b) Buddhist sutra in Uigur with Chinese page number on the left margin. (c) A sutra in 'Phags-pa' script with pagination in Chinese characters at the centre folding line. Museum für Völkerkunde, Berlin.
by expert engravers, and all pages of the books consecutively numbered. When completed, the tablets were placed in sealed bags to be kept by reliable persons, and if anyone wanted a copy of the book, he paid the charges fixed by the government. The tablets were then taken out of the bags and imposed on leaves of paper to obtain the printed sheets as desired. In this way, alterations could not be made and documents could be faithfully transmitted. A few years later the same description of Chinese printing was incorporated into a work by an Arab author. Thus the Chinese method of printing, including the various steps of transcribing, proof reading, cutting blocks, printing, and distribution, were for the first time carefully recorded.

Despite the fact that the Islamic religion did not favour printing, some fifty pieces of printed matter, believed to have been made between +900 and +1350, were found in Egypt toward the end of the 19th century. These are all fragments of Islamic prayers, charms, and texts from the Koran in old Egyptian script (Fig. 1202). Except for one in red, they are printed on paper in black ink, though not by pressure but by rubbing with a brush in a way similar to the Chinese method. Judging from the materials used, the religious nature of the documents, and the printing techniques used, experts believe that these printed specimens are connected with printing in China and Central Asia rather than an independent development. The time of the transmission to Egypt is uncertain, but scholars incline to a comparatively late date, after the time printing in China had begun to travel across Turkestan to the Arab world during the Mongol conquest. It could have been introduced through Persia or by travellers or traders on other routes, since Chinese intercourse with North Africa was very close in the early part of the +14th century.

After the submission of the Uighurs in 1206, the Jurchens and Koreans in 1231, and the Persians in 1243, the Mongol army moved farther north to overrun Russia in 1240 and to invade Poland again in 1259 and Hungary in 1283. They thus reached the border of Germany where block printing appeared not long after the climax of the Mongol conquests. Along with the military expansion, commercial, diplomatic, and cultural relations developed between Europe and Mongol China during the 13th and early 14th centuries; overland highways connecting China,

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a Cf. tr. by E. G. Browne (1), pp. 102–3.
c The methods of Chinese printing had never been recorded by any Chinese writer until modern times. This description by Rashid-ed-din, although brief, is probably the earliest record of the techniques of Chinese printing in any language including Chinese.
d Over 100,000 items of documents in ten different languages, dating from the −4th to the +14th century, on papyrus, parchment, and paper, excavated in the ruins of an ancient city in Egypt, are kept in the Erzherzog Rainer Collection of the Austrian National Library in Vienna, and additional prints are in Heidelberg, Berlin, and Cairo; see Carter (1), pp. 176–8, 181 n. 1.
e A Hebrew block print from the late +14th century has recently been found and studied at the Taylor-Schechter Genizah Collection of the Cambridge University Library. It is believed that the Jews of Egypt might also have adopted the method of block printing used by the Egyptians at the time. I am grateful to Dr L. C. Goodrich for calling my attention to the report in The Jewish Week, 8 Oct. 1982, p. 26.
g Cf. the travels of Ibn Batuta (d. 1398) in Yule (2), iv, pp. 1–166; also Duyvenduk (8).
Persia, and Russia were built to help the flow of increased traffic in the way of couriers, caravans, craftsmen, and envoys. In 1245 an embassy was sent to the Mongol court by the Pope, who received in reply a letter with a seal carved by a Russian in Chinese characters and impressed in red (Fig. 1203). Soon after, in 1248 and 1253, two other embassies were sent by the King of France and, as we have seen, one of the envoys, William Ruysbroeck, was the first European to report on the use of paper money in China. The same practice, described by Marco Polo in the record of his travels, was somewhat later, but after Polo left China in 1294, John of Monte Corvino, a Roman Catholic missionary, was sent there by the Pope, and stayed for over thirty years until his death in 1328. He and other missionaries worked in Peking, Fukien, and Yangchow, building churches, learning the language, translating the Bible, and preparing religious pictures as aids to preaching Christianity. Since the printing of Buddhist pictures was very common

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2. Roman Catholic tomb tablets dated to 1332 from Chhuanchow, Fukien and to 1342 and 1344 from Yangchow, Chiangsu were recently found, indicating a sizable European community in China under the Mongol rule, with Catholic converts estimated at 30,000 to 100,000 at the time; see Rouleau (1), pp. 346 ff., Hsia Nai (7), pp. 532 ff.

1 護國安民之寶
in China before and during this time, the use of this simple and convenient method for reproducing the translated Bible and religious pictures would have been natural. As these materials were required in large numbers of copies for circulation both among Chinese Christians and also among non-converts, it would be surprising if they were not printed. If they were, then the sudden appearance of religious prints and block books in Europe in the early 14th century can be reasonably explained.\(^a\)

Before the use of typography in Europe in the middle of the 15th century, various kinds of printed matter were already there, as early perhaps as a century or more before Gutenberg. There were playing cards, printed textiles, prints of religious images, and block books, all of which involved the use of wood blocks for duplication. Among these, playing cards were one of the earliest examples of block printing to appear in Europe, doubtless because of their early and widespread use in the East. For card games were played in China before the +9th century, at the time when books were evolving from paper rolls to paged form,\(^b\) and they spread over much of the Asian continent before the Crusades. Probably they were brought to Europe by the Mongol armies, traders, and travellers, some time in the early 14th century (Fig. 1204),\(^c\) references to their earliest appearance being 1377 in Germany and Spain, 1379 in Italy and Belgium, and 1381 in France.\(^d\) Because card games were played in all sectors of society, their popularity demanded the reproduction of playing cards in great quantity, though the craze for gambling

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\(^a\) The close resemblance in techniques and appearances between European and Chinese block printing is further discussed below, pp. 313 ff.

\(^b\) See discussion of playing cards in China on pp. 131 ff. above.

\(^c\) Blum (2), p. 43; De Vinne (1), p. 108.

\(^d\) An Italian writer, Valère Zani, of the 17th century said that Venice was the first European city in which Chinese cards were known; cf. Carter (1), p. 192 n. 24.
resulted in their prohibition on economic and moral grounds by government and religious authorities.

The earliest playing cards were manufactured in various forms and in different ways: by painting, by printing outlines to be filled in with colour by hand or with stencils, or by printing from wood blocks or copper engravings. The more expensive ones were printed from a master engraved in intaglio. A recent study reveals that Gutenberg had a major role in the early development of copper engraving to make masters for producing playing cards, because it is suggested that when financial disaster forced the closing of his Mainz workshop, the figures originally intended for decoration of the 42-line Bible were used to print cards instead.\(^a\) Although critics have questioned whether cards exerted any tangible influence on the art of printing,\(^b\) the association between printing books and playing cards does suggest a close relationship between the two.

Printing on textiles has generally been considered one of the forerunners of

\(^a\) After comparing some of the designs on playing card with those in the 42-line Bible, Lehmann-Haupt (2), p. 3, says that the designs of the masters were developed by artists connected with Gutenberg's workshop, but that the mechanical means for the multiplication were made by Gutenberg himself.

\(^b\) See Laufer's review of Carter in *JAOS* 47 (1927), p. 76.
printing on paper. Since the method is identical, the transfer from one material to the other is simple, since textile printers and the early block printers in Europe were closely connected. Professional wood carvers could of course, be employed for printing on any material.\(^a\) The technique of carving blocks for printing on textiles was in fact exactly the same as that for paper. The same kind of wood was chosen, the transfer of design from paper to block, the manner of cutting in relief, and of placing cloth on the block and pressing it with a burnisher or pad stuffed with horsehair were all the same. If a piece of paper is substituted for a piece of fabric, the result is printed paper.\(^b\)

The earliest specimens of printed textiles extant in Europe are those from France and Germany dating back to the +6th or +7th century, even earlier than those from Tunhuang and Turfan.\(^c\) However, a recent discovery of silk fabrics at Ma-Wang-Tui, Chhangsha, indicating printing on textiles of a set of continuous patterns, goes back as early as the —2nd century.\(^d\) Whether European textile printing was influenced by the Chinese is not clear, but some patterns of Chinese origin, borrowed by Persian weavers, are said to have been transmitted to Western Europe, and certainly many Chinese decorative motifs had been successfully copied by European makers of figured fabrics before 1500.\(^e\)

Religious pictures and block books provide the closest examples of printing before Gutenberg. Similar in nature, and differing only in format, when single sheets of image prints were collected together, they naturally evolved into book form. The image prints were first produced in southern Germany and Venice and gradually spread over most of central Europe between 1400 and 1450.\(^f\) Their subject-matter is exclusively religious, including pictures of certain sacred personalities or representations of biblical stories with legends in Latin engraved at the foot of the sheet or in cartouches proceeding from the mouths of the principal figures.\(^g\)

Most of the several hundred image prints still in existence are undated, but they are believed to have been produced during the latter part of the 14th and early part of the 15th centuries. Although a few have some artistic merit, most of the pictures are crude in style and workmanship. They were printed in outline and filled in with colour by hand or by stencil, but all the same they may possibly have some connection with Chinese printing,\(^h\) since the use of block prints for Buddhist pictures had long been practised in China. Many such single-sheet prints with Buddhist figures and legends were discovered in Tunhuang, and printing of tens of thousands of such pictures on silk and paper are recorded in literary sources.\(^i\) Then,
in the 14th century when European missionaries were sent to China, they made use, it is said, of religious pictures for distribution to the ignorant. It is possible, therefore, that these old practices for religious propagation in China were borrowed for similar purposes in another land.

At first, each picture was printed on a single sheet, or sometimes pictures were paired on one sheet, but later, some were pasted back to back or printed on both sides of the paper and gathered into books. The block prints that have been preserved include some containing pictures with text (Fig. 1205) and some having pictures alone; only very few have text alone. They were prepared not by priests or
in monasteries, but by independent printers who sometimes also produced playing cards, image prints, and even textiles. The demand for block printed books was probably very great, as the few such books still in existence are known to have been published in numerous editions, and their production continued after typography came into fashion. This was probably because block books were familiar to users throughout Europe, they cost less to produce, and block carvers were there to continue their traditional way of business until their generation passed away.

The close resemblance between the early block books of Europe and those of China is probably the most convincing evidence that European printers followed Chinese models. Not only were the methods of cutting, printing, and binding similar, but also the materials and the manner in which they were used. It is stated that the wood used in European xylography was cut parallel with the grain in flat blocks. Moreover, the material to be printed was transferred from paper to the woodblock on which it was fastened with rice paste, two pages were engraved on one block, water-based ink was used, the impressions were taken by means of friction on one side of thin paper, and the double pages were put together two by two with the blank sides folded inside. All these procedures were not only exactly the same as the Chinese methods, but were contrary to prevailing European practice. The European method was usually to cut wood across the grain, to employ oil-based inks, to print on both sides of the paper, and to use pressure rather than rubbing.

Robert Curzon, Baron de la Zouche (1810–73), has said that the European and Chinese block books are so precisely alike, in almost every respect, that we must suppose that the process of printing them must have been copied from ancient Chinese specimens, brought from that country by some early travellers, whose names have not been handed down to our times. Since all the technical processes are of Chinese rather than European tradition, it seems that the European block printers must not only have seen Chinese samples, but perhaps had been taught by missionaries or others who had learned these un-European methods from Chinese printers during their residence in China.

(4) Chinese Background of European Printing

While Chinese paper was mentioned by European travellers as early as the 13th century, the art of printing in China was not clearly recorded in European literature until some three centuries later. Only after the accomplishments of Gutenberg and other printers became known in the middle of the 16th century, did European writers begin to record the invention and look into the origins of

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a De Vinne (1), p. 194.
b Cf. Ibid. pp. 119–20, 203; Isaiah Thomas (1), pp. 75–6; also see pp. 222 ff. above.
printing. The fact that printing was used in China several centuries before it was in Europe was acknowledged by historians and other writers, who also offered the opinion that European printing was influenced by the Chinese, and although none of their theories have been substantiated further, neither have they been disproved. On the other hand, these earlier opinions have provided some incentive for later scholars to try to trace possible Chinese connections with European printing, and while no concrete proof has yet been presented, circumstantial evidence is strong. Today, even one who believes that printing in Europe in the 15th century was ‘an altogether independent outgrowth of its own times and conditions’, has acknowledged that ‘Europeans in their varied contacts with the Orient learned something of printing and perhaps even saw documents and books printed on paper’. Almost all defenders of an independent origin of European printing emphasise technical differences between Chinese block printing and typography, but not the cultural considerations offered by many earlier and later writers.

The question of who was the inventor of printing was raised as early as the beginning of the 16th century by Garcia de Recende (c. 1470–1536), a Portuguese poet who, incidentally, refers in a poem to the question of whether printing was first discovered in Germany or China. But it was not until the middle of the century that Europeans began to write books on printing and to notice that printing had been used much earlier in China. The first to make a clear mention of Chinese printing was the Italian historian Paulus Jovius (1483–1552), who noted that printing was invented in China and introduced to Europe through Russia. In his *Historiæ sui temporis*, published in Venice in 1546, he wrote:

There are there (Canton) printers who print according to our own method, books containing histories and rites on a very long folio which is folded inwards into square pages. Pope Leo has very graciously let me see a volume of this kind, given him as a present with an elephant by the king of Portugal. So that from this we can easily believe that examples of this kind, before the Portuguese had reached India, came to us through the Scythians and Muscovites as, an incomparable aid to letters.

Jovius had originally studied medicine but he was close to the political and religious powers in Italy, was sent as ambassador to Moscow not long after Russia was freed from Mongol domination, and wrote a history and several other books about Russia. He may also have had some knowledge of China, as we are told that

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*The first work on the invention of typography, *De Typographia Inventione*, was written by Matthias Richter and published in Copenhagen in 1566; and no less than four similar titles were published in the 16th century; see list in McMurtrie (3), p. 26.


* See Mendes dos Remédios (ed.), *Garcia de Recende: Miscellanea. . .* (Caimbra, 1917), p. 63, and in which stanza 179 implies the question of priority of this discovery; Lach (7), 11:2, pp. 118, 127.


* Jovius’ opinion was apparently used by many European writers of the 16th and 17th centuries without acknowledgement. His name was perhaps first mentioned by Richard Smith in his unpublished manuscript of 1670, titled ‘Of the First Invention of the Art of Printing’, which states that printing ‘was used by the people of Sina or China in the utmost parts of the East some ages before it was known in Europe’, and ‘that art came unto us by the Scythians and Muscovites before Portugals came into India’; see Smith (1), p. 10.
several Chinese books and maps together with their translations were sent to him by the Portuguese historian João de Barros (1498–1570). With his professional and academic credentials, ‘his statements concerning Russia therefore carry considerable weight’, as Carter has remarked, and even though he gave no references for his claims about Chinese printing, as a historian he must have had some evidence to support his statements, of course that evidence might have seemed too obvious to need mention in a general history, for contacts between East and West had been so frequent during the period of the Mongol conquests, not long before his lifetime.

A little later, Gaspar da Cruz and Martín de Rada, the two early visitors to China whose comments on paper were mentioned earlier, also made some remarks on Chinese printing. Cruz said that ‘it is over nine hundred years since the Chinese have used printing, and that they not only make printed books but also different figures’. In saying this, he was the first European visitor to China who indicated a period for the earliest use of printing not only for books but also for pictures or illustrations. Theories that printing originated in the Sui or early Thang in the +6th or +7th century were generally spoken of in the latter part of the Ming dynasty, the time when Cruz was in China, while numerous books printed with illustrations or separate sheets of pictures would also have been available to him.

Rada mentioned Chinese printing in his reports and also brought back to Spain a number of Chinese books. He talked with a Chinese official who ‘was greatly surprised to learn that we likewise had a script and that we used the art of printing for our books, as they do, because they used it many centuries before we did’. He also acquired many ‘printed books of all the sciences, both astrology and astronomy, as [well as] physiognomy, chiromancy, arithmetic, and their laws, medicine, fencing, and of every kind of their games, and of their gods’. Among the books brought from China were eight local gazetteers, in which, he noted, such precious metals as gold and silver were recorded.

From this time on, similar statements were made by many other writers, including Juan González de Mendoza, whose most comprehensive and authoritative work on China published in 1585 devoted two full chapters to Chinese books and printing. In one of these, ‘The substance and manner of these books that Friar Herrada and his companions brought from China’, de Mendoza describes in categories all kinds of books he acquired there. The list includes

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d The earliest suggestion that Chinese printing originated in the Sui dynasty (+581–618) was made by a Ming scholar, Lu Sheng (1477–1544), whose theory that wood blocks were carved in +593 had great influence on later opinions; see discussion on pp. 148 ff., above.  
e Two reports: ‘Narrative of his mission to Fukien (June–October, 1575)’ and ‘Relation of the things of China which is properly called Taybin’, written late 1575 or early 1576, are translated in Boxer (1).  
f Boxer (1), p. 255.  
g Ibid. p. 295.  
h Ibid. p. 261, mentions that ‘seven of these books came into our hands’, but eight different titles are described in pp. 293–4.
history, geography and gazetteers, chronology, navigation, ceremonies and rites, laws and punishments, herbals and medicine, geology, astronomy, biographies of famous persons, games, music, mathematics, architecture, astrology, chiromancy, physiognomy, calligraphy, divination, and military works. All these books must have been read with the help of native Chinese in the Philippines, where the missionaries stayed. As Mendoza wrote, 'they (friars) had bought a good number, out of which are taken the most things that we haue put in the small historie'. Interestingly, a few Chinese books of the 16th century survive in libraries of Spain and Portugal.

In another chapter, 'Of the antiquitie and manner of printing booke, vsed in this kingdom, long before the vse in our Europe', he discusses the admirable invention of printing begun in Europe in 1458 by John Gutenberg of Germany, whence the same invention was brought into Italy. He added:

But the Chinos doo affirm, that the first beginning was in their countrie, and the inuentiour was a man whome they reverence for a saint: whereby it is evident that manie years after that they had the vse thereof, it was brought into Almaine by the way of Ruscia and Moscouia, from whence, as it is certaine, they may come by lande, and that some merchants that came from Arabia Felix, might bring some books, from whence this John Gutembergo, whom the histories dooth make authour, had his first foundation.

It is interesting to note that, besides his claim that Gutenberg was influenced by Chinese printing which came by way of Russia, he also mentioned another route, through trade from Arabia by sea. He concluded:

The which beeing of a trueth, as they haue authoritie for the same, it dooth plainlie appeare that this inuenition came from them vnto vs: an for the better credite hereof, at this day there are found amongst them many bookes printed 500 years before the inuenition began in Almaine: of the which I haue one, and I haue seen others, as well in Spaine and in Italie as in the Indies.

Mendoza's generalisations concerning things Chinese had great influence on some later writers, and throughout the 16th century, such authors as the eminent French historian Louis le Roy (1510–77), Francesco Sansovino (1521–86), a renowned poet and translator; and Michel de Montaigne (1533–92), a brilliant essayist, all repeated the same story that printing originated in China several hundred years before it reached Europe, and inspired Gutenberg's invention.

Besides these opinions, which seem to have all derived from Jovius's account, there is a different view which points to direct and personal contacts with Chinese printing. This alternative theory relates to an Italian engraver, Pamfilo Castaldi (1398–1490), who in 1868 was commemorated by a statue in Lombardy honouring him for having introduced typography to Europe. He is said to have been born at

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\(a\) De Mendoza (1), ed. by Staunton, pp. 134–7.  
\(b\) Ibid. pp. 133–4.  
\(d\) Cf. De Mendoza (1), ed. by Staunton, p. 132.  
\(e\) Ibid.  
\(f\) See citations in Lach (5), II: 2, pp. 214, 296, 310–11.
Feltre, a town northwest of Venice, and to have used wooden movable type after having seen Chinese books brought from China by Marco Polo. In 1426 he printed at Venice several broadsides which are said to be preserved among the archives at Feltre. The tradition goes on to say that Gutenberg, whose wife was of the Venetian Contarini family, had seen printing blocks brought from China to Venice, and by development of this inspiration arrived at the invention of printing. This story was given by the Robert Curzon, in two accounts to the Philobiblon Society of London in 1854–8, citing a newspaper article by a Dr Jacopo Facen of Feltre in 1843. The same story is included in several editions of Marco Polo, and Henry Yule, the eminent translator of Polo's works, was disinclined to the view that this tradition was correct, though he believed that many a traveller and overland trader may have brought home Chinese wood blocks.

While many authors suggest the Chinese origin of printing and its influence on European typography, there are some who hold a different opinion, not disputing the cultural theories, but basing their contention primarily upon technical differences between Chinese and European methods. An early expression of this view was made by Guido Panciroli (1523–99), an Italian scholar and author, who believed that Gutenberg's movable type differed in technique from Chinese printing. He said that 'typography is old in China, but as found out in Mentz, it is a modern thing'. He did not specify what the differences were between the two, but implied an improvement of modern technology over the old method. As explained by André Blum, a respected author on the origins of paper and printing, 'The essential element in the invention of printing in the West is not that it was derived from wood block printing . . ., but that it consisted rather in the creation of movable characters made from a fusible metal.' He said that three things are needed for typography: a matrix or mould in which the letter is engraved in intaglio, an alloy cast in the matrix, and a reproduction of the character in relief on the punch. Actually, a similar method of casting metal types from punches was used in the Far East at least half a century before Gutenberg, and there are theories that typography could have derived from there. As G. F. Hudson says: 'Since Korean typography underwent so remarkable a development just before the appearance of the process in Europe, and there were possible lines of news transmission between the Far East and Germany, the burden of proof really lies on those who assert the complete independence of the European invention.'

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*a* This account is given in Curzon (1), pp. 6 ff.; cited in Yule (1), i, pp. 138–40.

*b* Curzon (2), p. 23.

*c* Il Gonditore, no. 103, of 27 December 1843; cited in Yule (1), i, p. 139.

*d* Yule (1), i, pp. 139–40.

*e* See English tr. of his Nova reperta, titled The History of Many Things Lost (London, 1715), pp. 342–3.

*f* Cf. Blum (2), pp. 20–1.

*g* See discussion on pp. 327 ff. below.

*h* Dr Fang Chao-ying of Columbia University has suggested in an unpublished paper, 'On Printing in Korea', the possibility that European typography might have come with the knowledge of Korean movable type through the contacts between European residents and Korean students at the Mongol capital of Peking in the 14th century, just as in the case of the meeting between Adam Schall and the Korean crown prince in the 17th century.

Another question of controversy is whether typography was an independent invention or merely a combination of existing technology. As Theodore De Vinne remarked, some scholars believe that ‘typography was not an original invention, that it was nothing more than a new application of old theories and methods of impression’. According to this view, engraving can be traced back to the Egyptian seals, printing with ink to Roman hand stamps, and the combination of movable letters to the suggestions by Cicero and St Jerome. Gutenberg, therefore, was not the first to print on paper, for printed matter, in the form of playing cards, prints of pictures and printed books, was a merchantable commodity before he was born.a

If typography was not an original invention, then the question arose whether existing techniques were derived from the East or the West. A British collector and antiquarian, John Bagford (1659–1716), wrote in ‘An Essay on the Invention of Printing’:

The general notion of most Authors is, that we had the hint [of printing] from the Chinese; but I am not in the least inclined to be of that opinion, for at that time of day we had no knowledge of them. I think we might more probably take it from the Ancient Romans, their Medals, Seals, and the Marks or Names at the bottom of their sacrificial Pots.b

Although this author and some others attributed the existing techniques, including the use of seals, ink, and other materials and facilities, to the root of Western culture and not to the Chinese, it is the reverse that is true, as discussed in detail in the Introduction of this study. All the basic elements prerequisite to printing were available both in the West and in China, but the combination of them led to the early appearance of printing in Chinese culture and not in the West.

After discussing various factors leading to the invention of printing in Europe, Douglas McMurtrie, a modern authority on the history of printing, argues that the Europeans may have learned the idea of printing, though not the processes, from the Orient, but ‘an idea is not an invention’.d This statement is certainly debatable. Since an invention always involves both novelty and practice, processes carried out without a novel idea cannot qualify as an invention. The materials and facilities for European typography, including the ink, metal, and the press, may be somewhat different from those used in the Orient, but they constitute only an improvement of an already existing idea and procedures to suit different circumstances. If the basic principle of printing is to obtain multiple copies of a positive impression with ink on paper from a mirror image, this very idea suggests an invention.

Based on this principle, block printing is the ancestor of all printing processes, no matter whether wood or metal; block or movable; or plane, intaglio, or in relief. If the technical differences of typography from block printing justify its consideration

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b This article was originally published in the Philosophical Transactions of the Royal Society, vol. 25, 1706–7, and reprinted by the Committee on Invention of Printing, Chicago Club of Printing House Craftsmen, Chicago, Illinois, 1940; Douglas McMurtrie says in the Introductory Note that critics considered him not a scholar and ‘quite incompetent’ to write on this topic.

c See above, pp. 3 ff.; also C. R. Miller (1).
as a separate invention, then all other new methods of printing, such as
lithography, offset, photogravure, and now film setting, would have to be regarded
as equally independent inventions.

In summing up, the origins of printing in Europe seem to have involved three key
questions. First, was typography an altogether independent invention, or was it
influenced by the principle and practice of block printing? Since block prints and
books existed in Europe before and contemporary with the beginning of
typography, most opinions agree that European printers were exposed to at least
the principle if not the practice of block printing. Secondly, if this was the case, was
block printing in Europe introduced from China? For this question, almost all the
views which have been expressed cast little doubt about the close relationship
between the two, and their near similarity has warranted the belief that European
knowledge of engraving on wood must have been taken from China. Thirdly, did
the first maker of European typography have direct or indirect access to Chinese
printing or metal type from the Far East? While traditions which suggest a
particular name or names are doubtful, it is the general belief that samples of
printed books, wood blocks, or metal types might have been brought to Europe
from the Far East by unknown travellers via land or sea trading routes. All this
circumstantial evidence suggests strongly the presence of a Chinese connection in
the origins of European printing.

(i) MIGRATION OF PAPER AND PRINTING
EASTWARDS AND SOUTHWARDS

Among the many neighbours of ancient China, some formed close ties with
Chinese civilisation while others did not. To the north and west, the Mongols,
Turks, Manchus, and Tibetans, although their histories were interwoven with that
of China through wars and conquests, did not assimilate Chinese culture until they
took up residence on Chinese territory. To the east and southwest, on the other
hand, the Koreans, Japanese, and Vietnamese were clearly identified with the
Chinese cultural outlook from very early times. They borrowed the Chinese
writing system, followed Confucian thought, modelled their political and social
institutions after those of China, and adopted Chinese forms of art and material life.
While Japan maintained an independent political relationship with China, both
Korea and Vietnam were under Chinese rule or acknowledge the suzerainty of
China for prolonged periods. In one way or another, these three nations, and
perhaps also Liu-Chhiiu, became parts of the domain of Chinese culture, which is
the basic element of East Asian civilisation.

(1) INCEPTION OF PAPER AND PRINTING IN KOREA

Korea not only was the earliest nation to borrow many things Chinese for her own,
but also formed a cultural bridge between China and Japan before they made