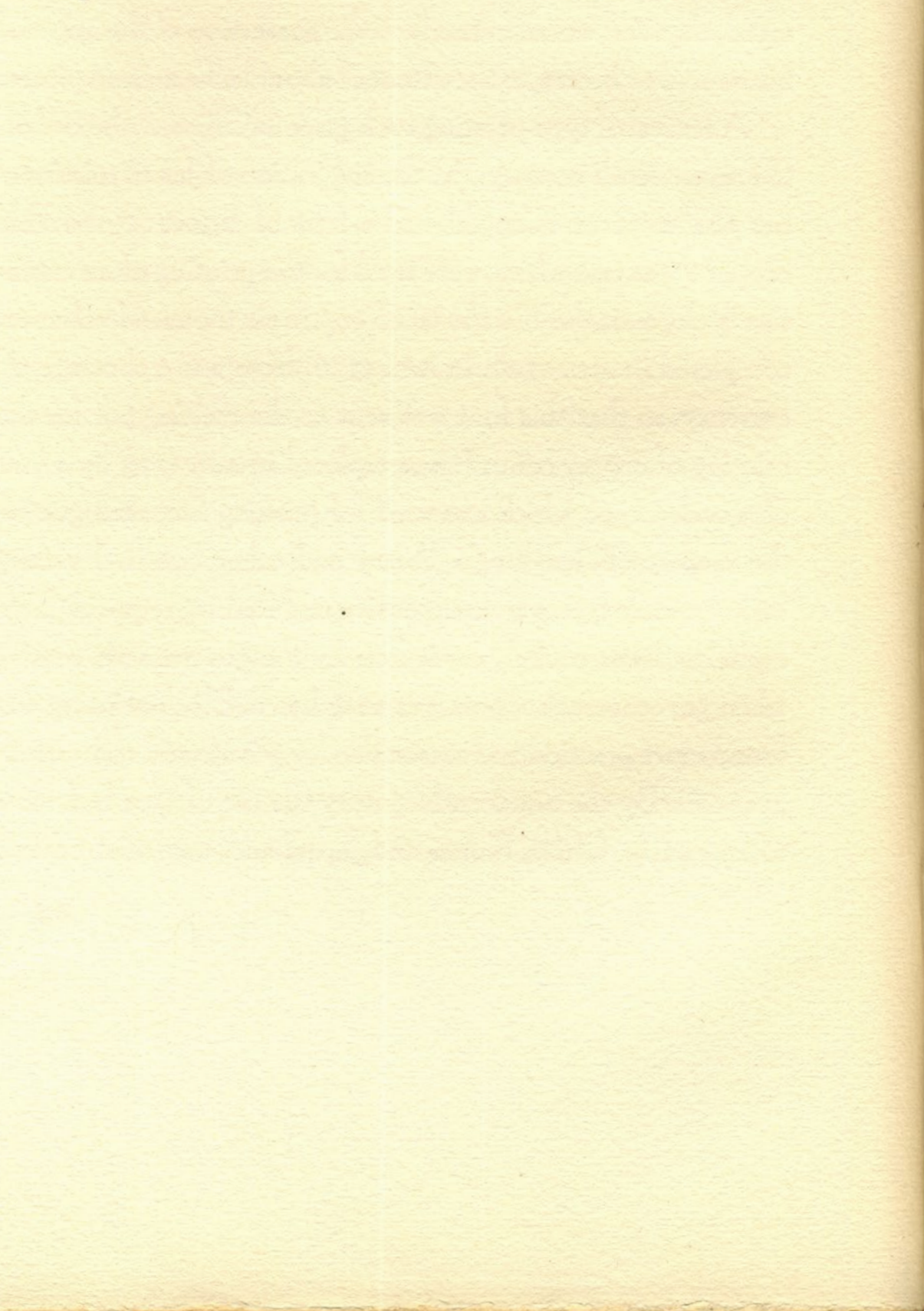


PAPER
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IN
ANCIENT
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Paper and Printing
IN ANCIENT CHINA

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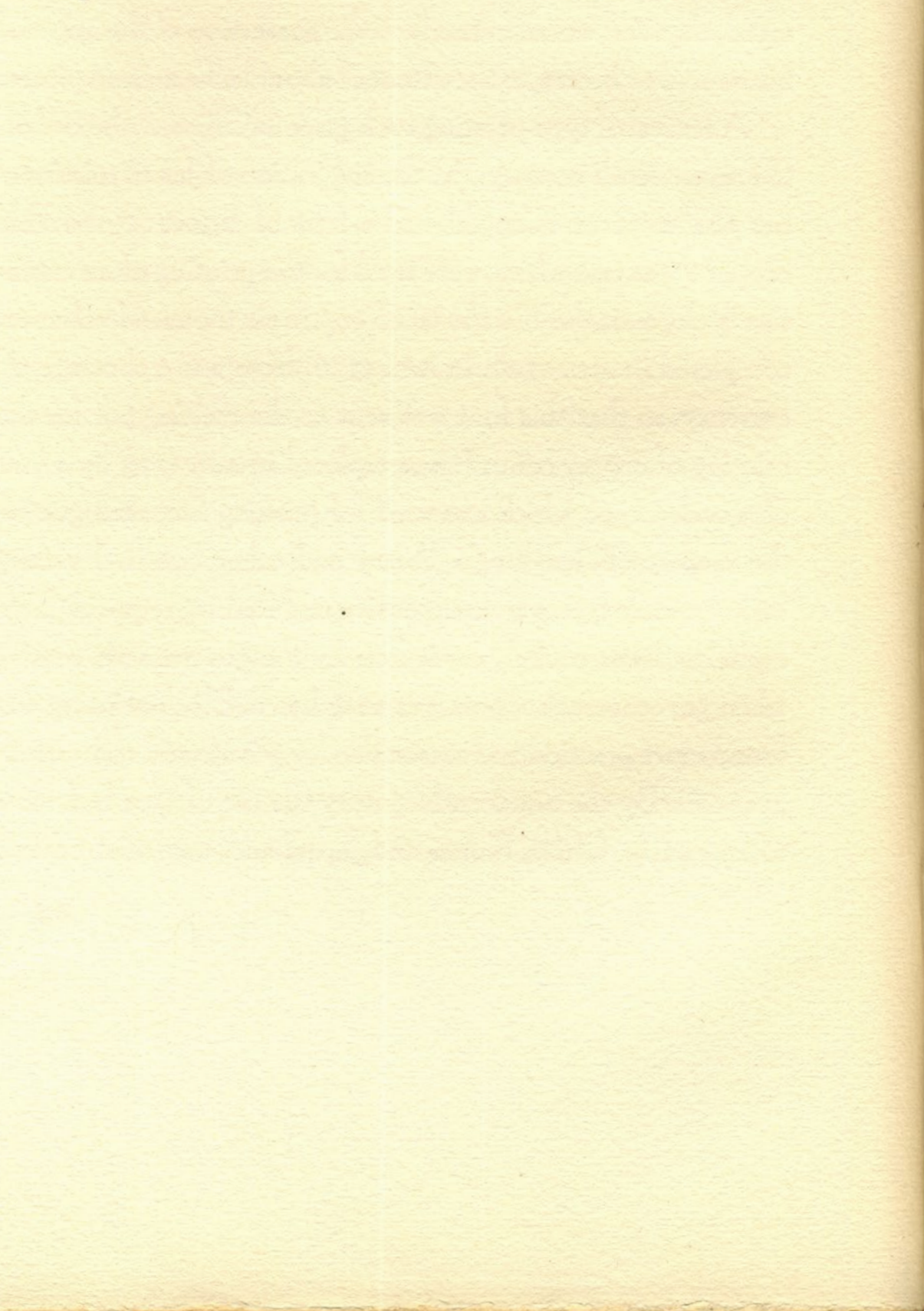
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Paper and Printing in Ancient China



Paper and Printing in Ancient China

THE ANCIENT SUMERIANS, Babylonians, Egyptians, and Greeks may have reached a flourishing civilization long before the Chinese, but all their achievements, however great, do not equal in importance the invention of paper which we owe to the Chinese and the art of printing that was born from it. Printing has been, and still is, the supreme factor in the progress of civilization. The Chinese as the inventors of paper were the first who printed books, many centuries before Gutenberg, and not only that—they have also made typography a fine art and produced books which belong to the finest examples of the craft. They have been a book-loving people for ages. The primary conditions of printing are paper, writing-brush, ink, and ink-pallet or ink-stone, which are still regarded by the Chinese as the four great emblems of scholarship and culture that form

the fundamentals of their civilization. These four constituents the Chinese may justly claim as their own, inventing them and perfecting them entirely from their own resources, unaided by any other nation; and this arsenal has largely contributed to make them a nation of learned, studious, well-bred and cultured men.

The turning point in the history of printing is the invention of paper by Ts'ai Lun in A.D. 105. In order to understand and appreciate this event correctly, it is necessary to have some idea of what writing-materials were prior to that date and in what condition the early documents and books were before the art of printing came into being. I shall therefore discuss, first, Chinese books before the invention of paper and, second, Chinese books after the invention.

The earliest means of communication in ancient China of which we have any knowledge reminds us of the quippus of the ancient Peruvians.

In a prehistoric age we find in China knotted cords in use for the conveyance of messages, chiefly in the transaction of government business. Lao-tse, the famed philosopher, in a sentimental yearning for the past, expressed the desire that he might bring his people back to the ancient usage of knotted cords; that is, the simple life of old. The Tibetans have a

tradition to the same effect, and several aboriginal tribes in the south of China availed themselves of this method as late as the twelfth century of our era.

In early historic times, calendars, calculations, and contracts were made by means of wooden tallies in which notches were carved with a knife. Even when writing had long been in use, contracts made by means of notches in a wooden stick were continued for simple business transactions — such as deeds, bonds, or obligations. The wooden stick was notched on either side and then split and equally divided between the two contracting parties, the creditor receiving the left half, the debtor the right half of the tally. When the time arrived for fulfilling the contract, the two halves were joined together to make sure that the notches of the one tallied with those of the other. When the debt was liquidated, all the creditor had to do was to break up his portion of the wooden contract. This was called “breaking the contract,” which meant as much as “fulfilling one’s obligation.” Credit systems were always highly developed in China, and there is an old story on record that a tailor even made garments on credit for a duke and that whenever the duke was in a position to render a payment on the instalment plan, the wooden tally was smashed by the happy tailor. Even when contracts were subsequently drawn up in writing, the

notches were retained as a means of checking the two halves or verifying the twin documents.

A survival of this practice still characterizes the modern banking system. Our banking methods are based on the signature and identification of the individual. Neither is required in China. A Chinese draft is made out in duplicate on a single long sheet of paper, containing the same matter on the right and left sides, one column of writing running exactly down the center. The document is evenly cut into halves across this line, the right half being given the bearer of the draft, the other half being mailed to the bank on which the draft is issued. When the bearer presents his half of the draft at this bank, it is carefully checked off and tallied with the other half which meanwhile arrived at the bank by mail; and if the two halves are found to fit perfectly together, payment is made, no receipt and signature being required.

These drafts bear a striking resemblance to the indentures used in old England. Hamlet, in musing over a lawyer's skull, exclaims, "Will his vouchers vouch him no more of his purchases, and double ones too, than the length and breadth of a pair of indentures?" They were referred to as a pair, as both copies of a deed were written on one piece of parchment or paper and then cut asunder in a serrated or sinuous line (a remi-

niscence of the notches in tallies), so that when brought together again the two edges exactly tallied and proved that they formed part of the same document.

A fundamental of culture in eastern Asia is divination. Divination was based on the bones of certain animals. In central Asia divination was practised from the shoulder-blade of a sheep which was scorched over a fire, and from the cracks thus arising in the bone the future was predicted. In ancient China the carapace of a tortoise was utilized in fortune-telling, and this magical procedure probably gave the impetus to the origin of writing. The tortoise was regarded as a sacred animal imbued with a knowledge of the future. In 1899 a deposit of several thousand fragments of bones, chiefly tortoise-shell, was discovered at Chang-te fu, Honan Province. These bones forming a sort of archives are engraved with inscriptions of a very archaic style, representing the earliest form of Chinese script we now possess, and were used for purposes of divination. They date in general to about 1500 B.C. The oracles and in some cases the answers were incised into these bones. We meet, for instance, inscriptions such as these: "We consulted the oracle to ascertain whether the harvest will be abundant," or "The oracle was consulted, as we wish to know whether God will order a sufficient rainfall so that we may obtain an adequate food-

supply," or "If we go a-hunting to-morrow, shall we capture any game?" Divination has always dominated the whole life of the Chinese from the cradle to the coffin, and no business was transacted, no marriage concluded, no burial undertaken, without consulting a fortune-teller. These ancient augurs formed a special profession, in their social position comparable to the lawyer of our society. In the same manner as the modern financier and captain of industry consults his lawyer on all important questions, so the Chinese did not make a move in the most trivial matters without asking a diviner's advice.

Further, we have from the early dynasties inscriptions on objects of bronze such as vases, bowls, bells and weapons, cast by means of the lost-wax process, the characters being traced in the wax mould, and being either incised or raised in the bronze. Tablets of jade were used for writing by the emperors; tablets of ivory, by the nobles and higher officials. The most common writing-material, however, particularly under the Chou dynasty (1122-247 B.C.), consisted of bamboo slips or square wooden splints which were perforated at their upper ends and fastened together by means of a silk cord or fine leather strip. The main difference between the utilization of bamboo and wood was this, that a message containing upwards of a hundred words was written on bamboo slips; when it contained less than

a hundred words, on wooden boards. The bamboo tablets were naturally narrow, and could be piled up in any required number, formed into a pack. The wooden documents, being too heavy to allow of a combination of many, served only for brief texts, as official acts and regulations, statistics of the population, and prayers, but they could not be united into books.

The early canonical or classical literature was handed down on bamboo slips of different lengths, each slip as a rule containing a single line of writing varying from eight to twenty-five or thirty words, and inscribed on one side only. A great number of such tablets was naturally required to make a book. Such books, of course, were exposed to many causes of destruction, chiefly from humidity and pernicious insects, so that bamboo books of early antiquity have long since disappeared, but a large number of wooden documents of the Han period have come to light in Chinese Turkestan. Another inconvenience of these books was their heavy weight. A curious incident in allusion to this fact is recorded anent the emperor Ts'in Shi who was compelled to examine daily state documents to the weight of a hundred and twenty pounds. Neither writing-brush nor ink was invented in those early days, and the bamboo and wooden memoranda were inscribed by means of a pointed bamboo or wooden stylus (*pi*) dipped in a black varnish (*ts'i*).

my history of ink embodied in the book of Frank B. Wiborg, *Printing Ink*, New York, Harper Bros., 1926, pp. 1-76.)

Paper was invented in China by Ts'ai Lun in A.D. 105 when he conceived the idea of manufacturing with refuse material of vegetable origin a substance light and economical at the same time, which would replace advantageously the writing-materials used up to his time. A record of this memorable event is contained in the biography of Ts'ai Lun, which is embodied in the *Annals of the Later Han dynasty* (chap. 108). Ts'ai Lun was born at Kwei-yang, a city in Kwei-chou Province in southern China. In A.D. 75 he entered the service of the Emperor Ho, and in A.D. 89 was appointed director of the imperial arsenals. He was deeply given to study, and whenever he was off duty, he would shut himself up for that purpose. The passage relating his memorable discovery runs as follows: "From times of old, documents had been written on bamboo boards fastened together. There was also paper made of silk refuse (*chi*). But silk was too expensive, and the bamboo boards were too heavy; both were inconvenient. Therefore Ts'ai Lun conceived the idea of utilizing tree-bark or bast-fiber, hemp, and also old rags and fishing-nets for making paper. In A.D. 105 he submitted his invention to the emperor, who lauded his skill. From this moment there was no one who did not use his paper, and throughout the

empire, all people called it the 'paper of the honorable Ts'ai.'"

This brief and sober account reveals what the writing-materials were in the times before Ts'ai Lun, what his innovation consisted of, and what impression it made on his contemporaries. It should not be understood that the ingredients enumerated in this passage were mixed together and resulted in paper; but each substance was the principal constituent to make a particular kind of paper. Paper may be obtained from many and various plant-fibers by a process of cleaning, maceration, and drying. The paper of Ts'ai Lun was in fact distinguished, according to the material used, as "hemp paper," "bark paper," etc. He substituted vegetal fibers for the fibers of animal origin used previously; in principle he utilized two kinds of materials—the raw fibers of bark and hemp and the worked-up fibers of rags such as ropes and fishing-nets. He survived his invention for thirteen years, and was ennobled in A.D. 114 as marquis by the empress dowager. He was no favorite, however, with the empress; and when his patroness, the empress dowager, died, the empress began to intrigue against him. Driven to despair, he died a suicide by swallowing a dose of poison.

Two different places were pointed out in later times as the seat of Ts'ai's operations. According to one report, he had lived near Lei-yang in Hunan Province, where near his resi-

principal center for paper-making, and this region continues the manufacture to the present day. From Italy the art spread to France and Germany, somewhat later to England, where it began to flourish when the Revocation of the Edict of Nantes in 1685 sent many French paper-makers into exile to England and America. In 1690 (a millennium and a half after the first invention) the first paper-mill was organized in this country by William Rittenhouse at Roxborough near Philadelphia.

During the early centuries of our era, paper of a great variety, paper sized and loaded to improve its quality for writing, paper of various colors, writing paper, wrapping paper, even paper napkins and toilet paper, all were in general use in China. The method of sizing paper with starch is also an improvement initiated by the Chinese. Their ancient practice of extracting the fiber from the bark and other parts of plants by means of maceration is in principle identical with our modern method of extracting cellulose by means of chemical processes.

In the tenth century the Chinese conceived the idea of issuing printed paper money, which reached its climax under the Mongol emperors. It aroused the greatest admiration of Marco Polo, who devotes to it one of the most interesting chapters of his visit to the Grand Khan. The Mongol rulers introduced paper-bills into Persia under the Chinese name *chao*,

and in 1293 established a printing-office at Tabriz, where paper-notes were turned out by the Chinese method of block-printing.

We owe to China in particular also our paper-hangings or wall-paper. The walls and ceilings of rooms are invariably decorated in China with paper, on which different patterns are printed from wooden blocks. The paper is confined in size to foot-square sheets.

During the middle ages, Europe had only linen, silk, and leather tapestry. French missionaries in China sent to France some specimens of colored Chinese wall-paper, which stimulated a Frenchman, Le François by name, to establish a factory at Rouen in 1630 for the purpose of imitating the Chinese papers. This Rouen paper was exported to England where it became known as "flock-paper." The English claim a previous invention by Jeremy Lanyer who, in 1634, had used Chinese and Japanese processes. It was, however, as late as the middle of the eighteenth century that real colored papers were made in France and England. The actual importers of Chinese wall-papers painted or printed with pictures were Dutch merchants, who traded them also to France, England, and Germany, where they were used to decorate screens, desks, chimney-pieces, etc., toward the end of the seventeenth century. They were called pagoda-papers. The prices paid for these papers were exorbitant.

In 1770 there was advertised for sale in Paris 24 sheets of China paper with figures and gilt ornaments 10 feet high and 3½ feet wide, at 24 livres apiece, to be sold altogether, or in lots of 8 sheets each. By that time entire rooms were papered. In 1779 an apartment in Paris was advertised to let, having a pretty boudoir with China paper of 13 sheets in small figures representing arts and crafts.

Wall-paper was brought to America in 1735. Its manufacture was introduced into the United States in 1790 by two Frenchmen, Bouler and Charden, and only three or four firms engaged in the business before 1844. In that year the first machine for printing wall-paper was put up in the Howell factory at Philadelphia. Up to that date, wall-paper had been made in small sheets of 22 x 32 inches according to the Chinese fashion. After the establishment of machinery continuous rolls or webs of paper came into general vogue. The dependence on Chinese models is illustrated also in the two processes hitherto applied to wall-paper. The patterns were either put in with stencils and the background with a brush, or by means of block-printing, the design being engraved on a wooden block.

In old colonial mansions of Massachusetts, specimens of Chinese wall-paper are still to be found, some even imported in A.D. 1750 and still in a good state of preservation. Many of

the older American papers exhibit their relationship to the Chinese in that the decoration is not repeated, but runs continuous about the entire room or contains a scenic representation. An interesting book on this subject was written by Kate Sanborn, "Old Time Wall Papers, an account of the pictorial papers on our forefathers' walls" (Greenwich, Conn., 1905).

When the invention of rag-paper was made, the Chinese were in the possession of all technical materials that make the primary conditions for printing: an extensive literature; a suitable and economic medium, easily manufactured in large quantity, for taking print; and ink as the medium to fix permanently to the paper the written thought. And yet, it is astounding, centuries elapsed before any steps were taken in the direction of printing. This is the more amazing, as printing of an embryonic type was practised long ago by means of seals made of clay or metal in which the script stands out in the negative in the same manner as in the later block-prints. The case is of psychological interest inasmuch as it shows that new inventions depend not merely on the existence of mechanical appliances, but to a much higher degree on the mental attitude of society. Some dynamic force is required to set the slumbering spark afire, in order to create the demand for printing. The art of printing is the first step toward democracy, the education of the people, and na-

tional awakening. To this the intellectual minority in all countries of Asia and Europe was at first bitterly opposed. In ancient Egypt, if the idea of printing had ever been proposed, it would at once have been nipped in the bud by the caste of jealous priests. A similar situation prevailed among the Brahmans of ancient India, where the sacred hymns of the Veda were memorized and transmitted for ages from generation to generation merely by memory. Even at a time when an alphabet was introduced, the Brahmans first refused steadfastly to commit their sacred texts to writing, and but slowly and reluctantly yielded to this innovation which threatened to break down their monopoly and the prerogatives of their caste. In India, in opposition to China, it was the spoken word which was looked upon as a fetish. In China, it was the written word that was regarded with fervent reverence and treated as a fetish. This worship of the written word ultimately led to its permanent preservation in print, while in India this idea was always detested. Despite her close contact with China, India did not adopt from her paper and printing. Paper was introduced into India only in the Mohammedan period by the Arabs after the twelfth century, and only as late as the sixteenth century was the first printing press set up by the Portuguese at Goa. The first book printed there was Garcia da Orta's "Colloquies on the Drugs of India," 1563.

We might expect that printing should have arisen in the circle of Confucian scholars who certainly had an interest in preserving and diffusing their philosophical writings; but this expectation is not fulfilled, perhaps for the reason that the Confucian doctrines appealed largely to the intellectual minority, not to the masses. The people found more satisfaction in the tangible teachings of Buddhism which promised them speedy salvation in the paradise of Amitabha. The earliest attempts at printing from wooden blocks were therefore made in the camp of Buddhistic priests, and consisted of charms, especially for the healing of diseases, prayer formulas, and engravings of religious images, made with the avowed object of appealing to the sentiments of the people. The earliest of these charms extant were printed in Japan about A.D. 770 by order of the empress Shōtoku in fulfilment of a vow: one million charms were printed, placed in a million of small wooden pagoda models and distributed among the populace, these charms being believed to be efficient in expelling the demons of disease. Several of these are still preserved. The first object of printing, therefore, was not, as we might imagine, a desire for the diffusion of knowledge, but a desire on the part of an empress to acquire religious merit and to safeguard her people from the ravages of epidemics. The meaning of the charms was even unintelligible

to the people, for they were written in Sanskrit transcribed in Chinese characters.

It is uncertain to what date block-printing in China goes back. While no accurate date can be fixed and while there is no record of an inventor of block-printing, which was achieved by a gradual process, there are indications that the initial stages are traceable to the sixth and seventh centuries. During the ninth century printing from wooden blocks was practised in the farthest west of China, the province of Sech'uan, which seems to be the home of the art. Again, the books printed there were not intended for scholars, but for the people. They consisted chiefly of works on divination, dreams, geomancy, and elementary school books, but, as our Chinese informant writes, they were so spotty and blotted that they were difficult to read.

The earliest printed book in existence was discovered in the library of the cave temples of Tun-huang by Sir Aurel Stein in 1907, and is now in the British Museum. It is the Chinese version of a Buddhist Sūtra, the Vajracchedikā. It bears the date A. D. 868, contained in the colophon at the end. It reads, "Printed on May 11, 868, by Wang Chie, for free general distribution, that the memory of his parents be reverently perpetuated." In this case the printer performed an act of filial piety. The text is printed on a roll of paper 16 feet long and 1 foot

wide; it consists of seven sheets pasted together, and was printed from seven blocks. The frontispiece is the earliest datable woodcut. Printed books and single sheets, however, were exceedingly rare in the temple library of Tun-huang; among thousands of manuscript rolls only four printed rolls were found, and a not inconsiderable number of charms from single-page block-prints. The latter presumably were of local manufacture, the former imported from Sech'uan. Printing was practised under the T'ang (A.D. 618-906) to a limited extent only, and did not supersede the manuscripts which were evidently regarded as more meritorious.

A certain official, Feng Tao (A.D. 881-954), is credited by some with the invention of block-printing. He was a versatile politician who served under no less than ten emperors of four different houses. Presenting himself at the court of the second emperor of the Liao dynasty, he asked for a post. He said he had no home, no money, and very little brains—a statement which appears to have recommended him strongly to the sovereign, who at once appointed him grand tutor to the heir-apparent. Block-printing was certainly known long before Feng Tao's time, but he was the first who applied it to the printing of the Confucian classics, and this is the reason why Confucian scholars have stamped him as the inventor of block-printing.

Under Feng Tao's direction the ancient canonical literature with its host of commentaries was printed for the first time in 130 volumes. The work of editing and printing lasted for twenty-one years and was completed in A.D. 953. Up to the year 1064 the private printing of the classics was forbidden. All printing was the prerogative of the government and had to give the orthodox accepted text. Of Feng Tao's edition nothing unfortunately has come down to us. The great renaissance of culture that took place under the Sung dynasty (A.D. 960-1279) resulted in an enormous output of literature and a corresponding advance in the art of printing.

As to the technique of the block-print process, it is simplicity itself: the book undergoes only three principal stages. What is composition among us is performed by a professional calligraphist, who receives the manuscript from the author's hands and writes it out in clear and uniform style on thin sheets of paper. Prefaces contributed by friends (and most books are introduced by a number of prefaces) are usually facsimiled from their own hand-writings, and may even be written in an archaic or highly ornamental style. Calligraphy, like drawing and painting, is an art, and the three are closely interrelated. A point worthy of note is that the Chinese scribe, as well as the draftsman and painter, is deprived of the privilege of making corrections or

alterations. Chinese paper and silk are highly absorbent materials, and a stroke of the brush, once made, will stand forever, and cannot be erased. The artist therefore must be sure of a firm hand and a scrupulously thoughtful and precise technique.

When the manuscript is completed, it is sent to the block-engraver. The single sheets are pasted over the finely planed and smooth wooden blocks, usually of pear-tree wood, the writing turned face downward. As the paper is thin and transparent, the writing is perfectly displayed through the back. Then commences the task of the engraver who with a set of gouges, picks, and chisels pares the surface of the block around the characters, so that the script in negative stands out in a flat relief.

In this state the blocks are finally transmitted to the printer whose requirements are limited to just two brushes. He uses a round, bell-shaped brush of coir-palm fibers for rubbing ink over the block. Then he places a sheet of paper over it and takes the impression by means of a flat, handled brush, which takes the place of our press. The printed sheet, of course, represents an exact facsimile of the original manuscript, and the printer cannot make any mistakes. A single sheet, as a rule, consists of two pages with a margin in the center, that contains the title of the book on top, chapter and folio number in the middle and

usually title of the particular chapter at the foot. These sheets are folded and then stitched at the ends.

The Field Museum has an exhibit illustrating the whole process of wood-engraving and printing in China, Japan, and Tibet, also an exhibit of writing-materials, paper, brushes, inks, pigments, and ink-pallets. The oldest printing blocks in existence are likewise preserved in the Museum. They are engraved with floral designs and must have been made before the year A.D. 1108. They were found in the ancient city of Chü-lu in southern Chili, which was submerged by a flood in that year.

The results obtained by the economic process of block-printing are stupendous. It is best adapted to the genius of Chinese writing which employs many thousands of characters, and has many advantages over movable types which are expensive, difficult to store and to arrange and hard to find when needed in setting type. Block-printing could easily be established anywhere and made literature accessible to every one at a moderate cost; it is a democratic art. Above all, it has always satisfied the æsthetic sense of the Chinese in that the block-prints preserve accurately the beauty of form of the characters and the hand-writing of the individual. No two Chinese hand-writings are alike, and hardly two block-prints can be found in the same style of writing if based on the hands

of different individuals. In typography, of course, the type is standardized and conventional.

One of the disadvantages of block-printing was the storing, arrangement, and preservation of blocks which were easily destroyed by humidity or fire. For the printing of the Tripiṭaka, the sacred scriptures of the Buddhists, a copy of which is in the Newberry Library (printed in 1736-38), 28,411 blocks were required. It was customary, especially under the Ming, in the government printing office at Nanking, if single blocks were lost, to re-engrave these and to add the date on the margin. Thus, the Newberry Library has several editions of the dynastic histories made up from blocks of different dates such as 1368, 1530, 1531, 1533, 1572, etc.

As to the form of the Chinese book, it was originally in the form of a roll. The manuscripts written on silk under the Han were kept in rolls, likewise all manuscripts and xylographs from the second down to the tenth century. The Buddhists introduced the folded book, somewhat on the order of our railroad time-tables, and still retain it for their sacred literature. The stitched and paged book, as we have it now, is not older than the Sung dynasty and goes back to the eleventh century. How it originated is not yet ascertained.

The earliest printed book in existence in America is pre-

served in the Newberry Library, Chicago, and is dated A.D. 1167. It is entitled *T'ang Liu sien-sheng wen tsi* (No. 1174) and contains, in twelve volumes, the collected poems and essays of Liu Tsung-yüan (A.D. 773-819), one of the celebrated poets and essayists of the T'ang dynasty. The work next in date secured by me for the Newberry Library is a general history of China known as *Tung kien kang mu* by the philosopher Chu Hi, published in 1172; and it is a complete copy of this first edition in a hundred volumes, which is in the possession of the Library. It is a rare and fine specimen of Sung printing and perhaps the most extensive work of that period now known. Several Sung editions are also in the Library of Congress and in the Gest Chinese Research Library at McGill University, Montreal. One of the recent acquisitions of the latter is an edition of the Tripitaka of the Sung and Yüan periods, of different dates, the earliest actual print going back to A.D. 1232. This collection was first printed in A.D. 972.

The Chinese were also the first who conceived the idea of the printed newspaper. The Peking Gazette, "the News of the Capital" (*Ching Pao*), is the oldest daily paper in existence. It began to appear in A.D. 713 under the T'ang dynasty, and has since been issued daily until the collapse of the Manchu dynasty in 1911. It contained the imperial rescripts, decrees, and all official

news relating to interior and foreign affairs. It was printed in two editions, in a Government edition sent to officials throughout the empire, and in a popular edition sent to regular subscribers in the capital and the provinces; also a manuscript edition could be obtained.

One of the forerunners of printing is represented by inscriptions carved in stone tablets. China is a land of inscriptions many thousands of which are still in existence, and epigraphy is a favorite occupation of her scholars. As early as A.D. 175 the texts of the Confucian classics were inscribed on stone for their permanent preservation. Subsequently these texts were deeply incised in stones, and paper rubbings were taken from them for distribution among scholars. Stone tablets were the recognized method of preserving exact copies of fine calligraphy and drawings of great masters. Taking squeezes of all sorts of inscriptions has developed into a regular trade since the days of the Tang dynasty, and in Chinese collections are still preserved rubbings taken in the Sung and Ming periods, chiefly from inscriptions now lost, that are highly prized.

To obtain facsimile rubbings of inscriptions on stone or bronze, the Chinese use sheets of thin, but tough paper, which is folded, slightly soaked in water, and then evenly applied to the surface of the inscription. The paper is pressed in with a

wooden mallet and forced into every depression by means of a soft brush. When the paper becomes sufficiently dry, they go over it with a stuffed pad of cotton lightly dipped into liquid ink. When taken off, the paper shows a perfect impression of the inscription coming out in white on a black background. The men doing this work form a special profession, and as ancient inscriptions are numerous, there is a lively trade carried on in such rubbings to supply the demands of scholars.

At an early date the Chinese experimented with movable type. In the period A.D. 1041-49 a commoner, Pi Sheng by name, is said to have made a set of clay types which were locked in an iron frame for printing, but no print made from these types has survived. Under the Mongol dynasty, in the fourteenth century, type was cast of tin, and subsequently made of wood. Wooden types were made by Wang Cheng, a geographer and agriculturist, who likewise devised a revolving table upon which the types were arranged, and from these wooden types he printed his *Nung shu*, a work on agriculture. In a chapter of this work published in A.D. 1313 he records a history of his set of movable type, stating that the characters were first engraved in wooden blocks which were then sawed apart into individual types.

Printing from movable metal type on a large scale was first

practised in Korea, and reached there its highest development. A set of 100,000 copper types was cast in A.D. 1403 by order of the king, and actually used in the publication of many books up to the year 1544. The Japanese Government General of Chosen reported in 1916 that it has taken care of old types of metal, clay, and wood, formerly in the possession of the imperial household of Korea, to the extent of about half a million pieces.

A revival of type-printing took place in China at the end of the seventeenth century. At the suggestion of Jesuit missionaries the emperor K'ang-hi had a font of 250,000 movable copper types cast which were used for the printing of an extensive cyclopædia the *T'u shu tsi ch'eng*, in six thousand volumes, completed in A.D. 1726. In A.D. 1736 there was a shortage of currency, so that this font was sent to the melting pot for the minting of copper coins. It was replaced in A.D. 1773 by a font of wooden type which was used for printing the catalogue of the emperor K'ien-lung's library and other books. Printing from movable type was an expensive undertaking requiring large capital and was entirely carried on by the government, ceasing when government support was withdrawn. Block-printing was found more practical and reasonable for private and commercial purposes. By the nineteenth century the use of type had come to an end in China, Korea, and Japan, and was reintroduced

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from the West as an entirely new art. At present European typography and even paper and printer's ink dominate China, but one cannot say that the productions of these modern presses are as elegant, graceful, and artistic as the time-honored block-print.

