

## How Books Were Made

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**Abstrak:** *Permulaan penulisan dalam tamaddun silam merupakan satu langkah yang begitu penting dalam sejarah manusia. Rencana ini menghuraikan beberapa jenis bahan yang digunakan oleh manusia bagi maksud penulisan. Sejarah evolusi penggunaan bahan-bahan penulisan dikesan dari satu zaman ke satu zaman sehingga cara penulisan yang berbentuk buku seperti sekarang ini dicapai.*

**Abstract:** *The invention of writing in ancient times is one of the most significant steps in the history of mankind. This article traces the various types of material that have been used for the purpose of writing. The evolution in the use of these materials is traced from civilization to civilization to the culmination of the printed book as we know today.*

The invention of writing, the conscious use of codified sets of signs and symbols for the visual expression of ideas, thoughts or sounds, has without doubt been one of the most decisive steps in human history. Writing stores information for dissemination and for future use, and to this end objects are needed on which this information can be stored: writing becomes writing once it is written down on some sort of writing material. During the six millennia of recorded history, human inventiveness has applied itself to this problem with astounding ingenuity, producing at times widely different yet equally satisfying solutions.

The term manuscript, now commonly used all over the world, derives from the Latin phrase *codices manu scripti* which means literary 'a book (in codex form) written by hand'. This largely obscures the fact that nearly all major inventions connected with writing and writing materials (and the knowledge of how to store written documents) have originated in the countries of Asia or North Africa; *ex oriente lux* (from the east comes the light) is in this context more appropriate than ever.

The question of writing materials not only interests the historian but also the librarian in whose care books (whether written or printed) are entrusted, and who is responsible for devising appropriate means of storage and preservation. The following is

a short account of the wide range of materials used for writing and the way they have at times influenced the development of scripts, and the shape of the 'book' itself.

Why was a particular material chosen at a given time in one particular area? Among the many answers to this question three are decisive, namely: (1) the geographical availability of a particular material (palm trees grow plentifully in South and Southeast Asia); (2) the stage of technological development (the production of paper, the casting of metals and the preparation of parchment need advanced levels of skill); and (3) prevailing traditional values (neither Hindus nor Buddhists would write their texts on the skins of slaughtered animals; in the case of the former only the lowest castes would dare to touch so ritually unclean a material).

Wood, freely available in most parts of the world, has always been a popular writing material. Extant wooden writing boards from Egypt go back to the Middle Kingdom (2134–1789 BC); wooden tablets in various shapes and sizes, either covered with chalk, mud, brick dust or wax, lacquered, polished, or more often than not left in their original state, were used in Mesopotamia, China and the Mediterranean countries of classical antiquity. Greek and Roman writing tablets, rectangular boards with a slightly hollowed out surface filled with wax, and laced together not

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unlike a modern loose leaf binding, were one of the most popular forms of the manuscript and were referred to as a codex.

Another material which needs only a moderate amount of processing to make it suitable for writing is the bark of trees. In India two varieties were used: in the northwest of the subcontinent the Himalayan birch tree (*Betula utilis*) and in the northeast the aloe (*Aquilaria agallocha*). The earliest extant birch bark folios, cut, polished and oiled, are fragments of Buddhist works written at the beginning of the Christian area. There is reason to believe that birch bark manuscripts existed at the time of Alexander's invasion (326 BC) and the long, narrow shape of some early examples has provoked speculations about possible connections with Greek papyrus rolls. The majority of extant Indian birch bark manuscripts do however clearly copy the shape of the palm-leaf; in 16th and 17th century Kashmir even that of the codex. In Sumatra long sheets of coarse bark, folded accordion-wise into squares, served until quite recently as notebooks for Batak medicine men. Bark was also used, to great effect, by the Mayas and Aztecs of pre-Columbian America.

A material which had a lasting and decisive influence not only on the shape of the manuscript but also on the development of a large number of scripts in India and Southeast Asia was the palm-leaf. Altogether three species of palm trees provided material suitable for the production of manuscripts: the talipat palm (*Corypha umbraculifera*), the palmyra palm (*Borassus flabellifer*) and the lontar palm (*Corypha utan*). Unlike wood and bamboo, palm-leaves require a simple manufacturing process to render them suitable for writing. Each leaf has to be separated from the central rib, cut to size, then boiled and dried, usually several times, and finally rubbed smooth with a cowrie shell or a stone. A pile of leaves (inscribed on both sides), usually between 3–5 cm wide and 30–42 cm long, and secured between two wooden boards, was, until the beginning of the 20th century, the most common form of the handwritten book in South and parts of Southeast Asia. The shape of the palm-leaf influenced other materials: copper charters (title deeds connected with the donations of land) were fashioned in this format and often held together by a copper ring marked with the donor's seal. After the Muslims had introduced paper to India in the 13th century certain types of manuscripts retained the characteristic oblong shape, even the blank space in the text, originally left by the scribe to provide room for the cord, remained, and since it no longer served any practical purpose it soon became a focal point for decoration. Palm-leaf manuscripts have a long

tradition in South Asia and may have been in use at the time of the Buddha.

Since remote antiquity humans have made use of the skin of animals, first as clothes and shelter, later also as writing material. Skin converted into leather (by curing, processing and manipulation) is impervious to water and thus a highly durable material. In Egypt the earliest extant examples date from c. 2500 BC; leather was also an established writing material in Western Asia, Persia, Iraq and later Turkestan. It has always played an important part in Jewish ritual, even today the Torah scroll kept in the synagogue must at all times be made of skin. Neither leather, nor any of the other skin-based materials (parchment and vellum) ever reached further east than Iran since Hindus and Buddhists alike would have viewed with horror the idea of writing their sacred texts on the skin of slaughtered animals. As far as the shape of the manuscript is concerned, leather promoted the roll format since only one side is normally suitable for writing.

Some time between 200 and 150 BC attempts to improve the quality of leather led to the invention of parchment which takes its name from the city of Pergamum in Asia Minor from where it is said to have originated. To turn leather into parchment involves an already fairly complex manufacturing process: the whole skin has to be treated with lime, dehaired and defleshed, stretched (the thinner the parchment the finer its quality), scraped on both sides and treated with hot water, scraped again and rubbed with pumice stone and then dried. Recto and verso are easily recognisable: the inner (flesh) part is tougher, more yellow and is generally better able to retain ink; the outer (hair) part is smoother and easier to write on but has a tendency to make ink flake. Fragments have survived from the 2nd century BC but it was not before AD 200 that parchment started to rival papyrus in the Roman world, and two more centuries passed before it was used for the best books. More or less simultaneously the codex began to replace the roll format since there was no longer any need to write on one side only.

Silk, cotton and linen, originally meant for clothing, became during certain periods and in certain circumstances, established forms of writing material. Best known are perhaps the linen bandages of Egyptian mummies inscribed with passages from the Book of the Dead. In India, pieces of cotton, cut to size and treated with a paste made of rice or wheat flour, were until the present century used for the writing of texts and the Karnataka accounts. In Burma cotton cloth would at times be cut into palm-leaf shaped pieces, stiffened with black lacquer, a slow and painstaking process during which letters were

inlaid with mother-of-pearl. Manuscripts manufactured from cloth were not restricted to the East: Livy (59 BC – AD 17) speaks of the *libri lintei*, the linen books, which were used in Rome during his life time.

The most expensive material, silk, is a product of China where its commercial importance can be traced back to the time of the legendary Yellow Emperor (2640 BC). References to silk as writing material appeared in the 5th and 4th century BC in a manner which implies frequent use. But silk was at all times a costly commodity and eventually a recycling process, by which old silk rags could be pulped and the resulting mixture spread thinly on to a frame, led to the production of 'silk paper'.

One of the most durable forms of writing material is metal; only stone inscriptions guarantee similar permanence. This quality made it well suited for documents of a legal nature: bronze tablets inscribed with the Roman laws were supposedly kept in the Capitol. In South and Southeast Asia it was customary, until the last century, to record grants of land on (often palm-leaf shaped) copper plate charters which served the recipients as title deeds. The earliest extant inscribed copper plate comes from the Indus Valley (c. 2800 BC) but since we cannot read the script we are ignorant of its exact purpose. Lead, being pliable as well as durable, could be beaten into thin sheets and if necessary rolled up for storage; both Pliny (AD 23–79) and Pausanias (d 470 BC) make references to such conventions. Precious metals, gold and silver, were used, especially in the east, to stress the value of a religious text, to gain special merit by commissioning so expensive a 'book', to express proper respect for the position of the person to whom a letter was addressed, or simply to draw attention to one's own wealth and standing. Thus two beaten gold sheets, incised with a famous Pali verse, were, in 1896, found inside a brick (probably the foundation stone) of a Burmese Buddhist structure dating from 5th/6th century AD. In Sri Lanka the entire Buddhist canon was, according to tradition, written on golden plates in 88 BC, and as late as the 19th century Southeast Asian princes would at times write their letters on thin sheets of pure gold.

Finally there are the materials specially devised for the production of books: clay, parchment, papyrus and paper.

Clay tablets are one of the prototypes of the book. Between c. 3000 and the 7th century BC they played an important part in Mesopotamia and the ancient Near East. They were the first reliable writing material produced by artificial means from water-cleaned clay; the script impressed upon them

(while the clay was still wet) with a reed stylus, was one of the earliest systematic forms of writing. Inscribed tablets were sun-dried or baked in a kiln (according to the importance of the text they were meant to store); they were of various shapes and sizes, the most popular format being the many-sided cylinder and the oblong brick with convex sides. Because of the role they played in the social and economic life of the ancient city states, clay tablets were stored in special libraries attached to temples and palaces; they were foliated, indexed (according to the first sentence), cross-indexed (rather like a modern library record) and arranged on shelves in appropriate order.

Much has been written since antiquity on the use and production of papyrus. The plant itself (*Cyperus papyrus*) after which the material is named, was extensively cultivated in the ancient Nile Delta. One of its original local names was *P-apu* from which the Greek *papyrus* is derived; another Greek name for it was *byblos* (*biblion* being a book in the form of a papyrus roll). As an invention papyrus seems to be as old as the hieroglyphic script – an unincised roll dating from the First Dynasty (c. 3100–2890 BC) was found in a grave at Saqqara – and for over three millennia it held a dominant position, first in Egypt, and later also in Greece and Rome. Though other materials were simultaneously used, none was as serviceable, as pleasing, or could be produced as readily in equally large quantities. To manufacture papyrus, carefully cut pieces from the inner stem of the plant were laid cross-wise on top of each other on a special table, pressed or beaten together, and then dried in the sun. Several sheets glued together formed a roll, the best sheets being placed at the beginning with those of lesser quality coming towards the end. Papyrus could be produced in a wide variety of qualities: fine thin pale ivory-coloured sheets on the one hand and thick brown carton-like ones on the other. Basically a brittle material, earthenware pots, glass containers or parchment cases were often used for additional protection. Like leather papyrus was meant to be inscribed on one side only, hence the characteristic roll format of most papyrus books. At the beginning of the Christian era papyrus became increasingly scarce, and in consequence expensive. Traditional Egyptian society and economy, which had fostered its use and production, had disintegrated, and from AD 400 onwards the parchment book in codex form took precedence over the papyrus roll. After the 10th century the use of papyrus as a writing material rapidly declined and by the 14th century it was more or less extinct. It is not without irony that paper, the material which in the 15th century superseded the successor of

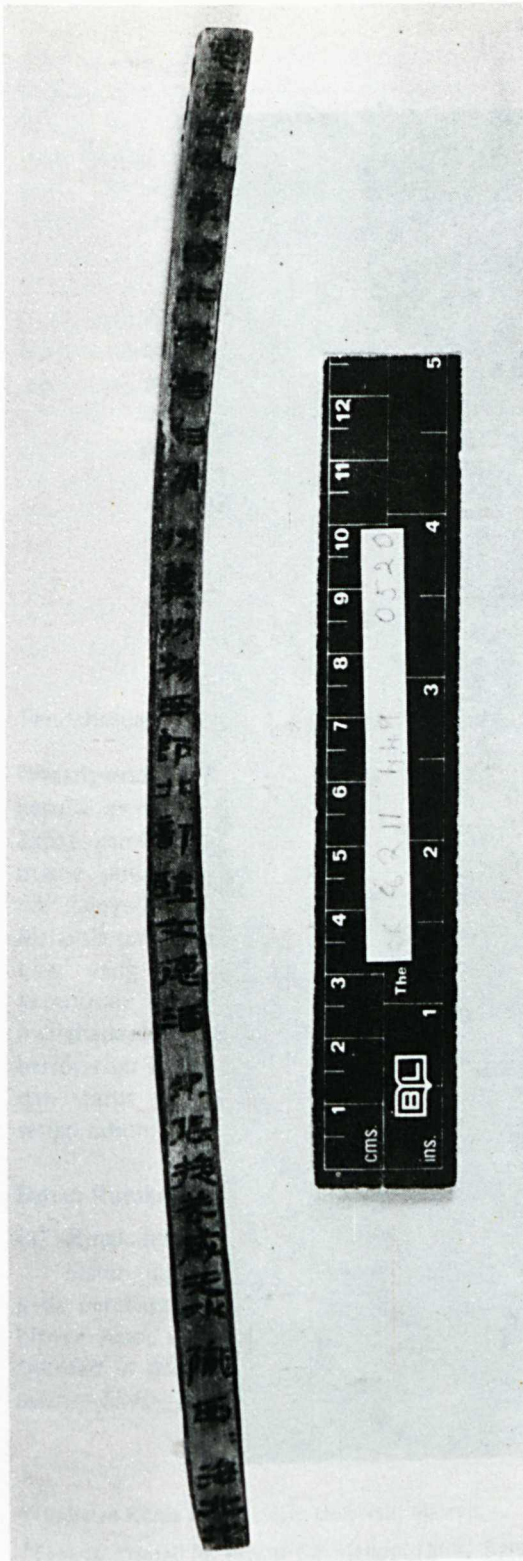
papyrus, namely parchment, takes its name via French and Latin from the Greek *papyros*.

We come finally to paper which lends itself with equal ease to the roll and the codex form of the book. According to traditional Chinese sources it was 'invented' by Cai Lun, a minister at the court of the Han Emperor Wu Di, in the year AD 105, though Cai Lun's role was probably more that of a supervisor. Among the factors which stimulated the process was the ever growing cost of silk, the knowledge of how to produce silk 'paper', and the cumbersome nature of bamboo books. The basic ingredients of paper were macerated linen rags. The manufacturing process was skilful and like that of papyrus a triumph of

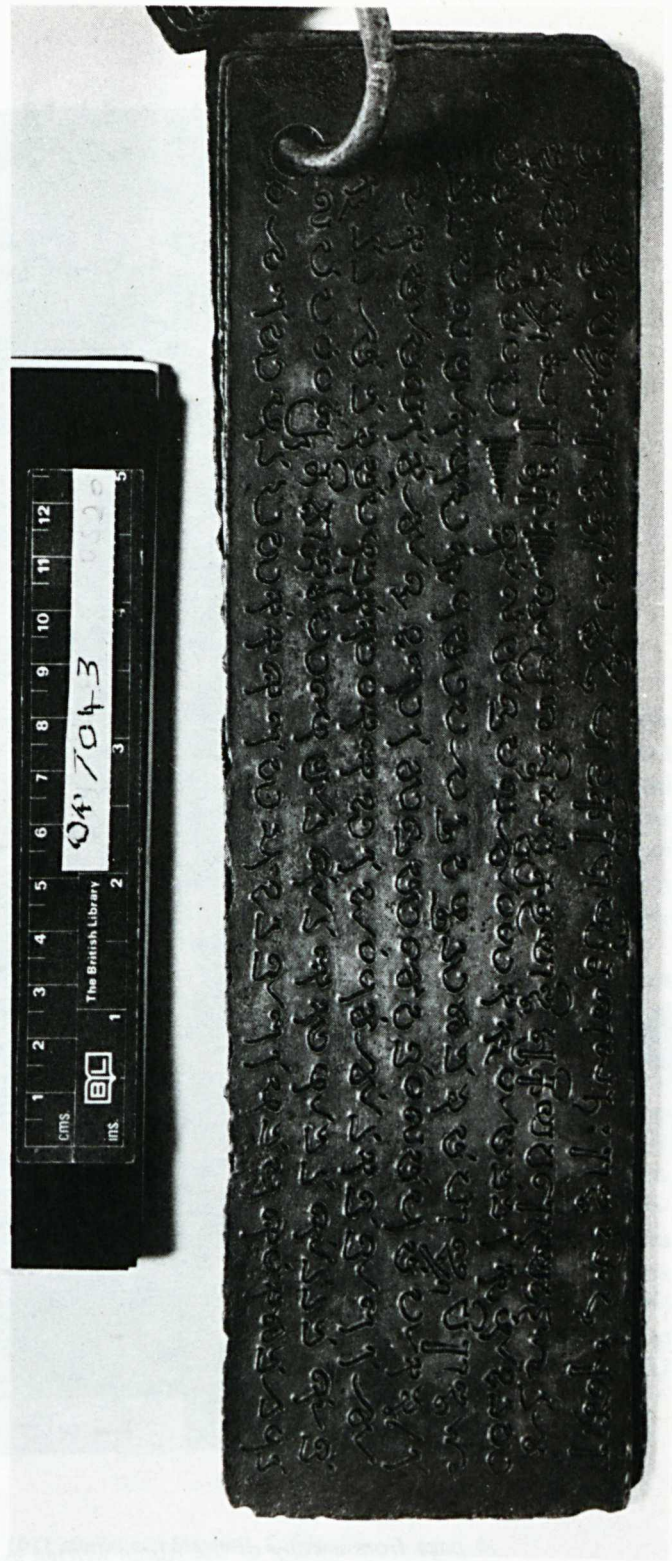
traditional technology. Paper reached Europe a millenium after its invention by a tortuous and not always easily verifiable route. By the 12th century the Muslims had introduced it via Samarkand, Baghdad, Damascus and Morocco to Spain and Sicily. When the Muslims lost Spain in 1492 the art of paper making passed into the hands of less skilled Christian craftsmen and its quality almost immediately declined. But in the following centuries paper established itself firmly in Europe. The manufacturing process remained basically the same until the 19th century when, for economic reasons wood was introduced as a substitute for linen.



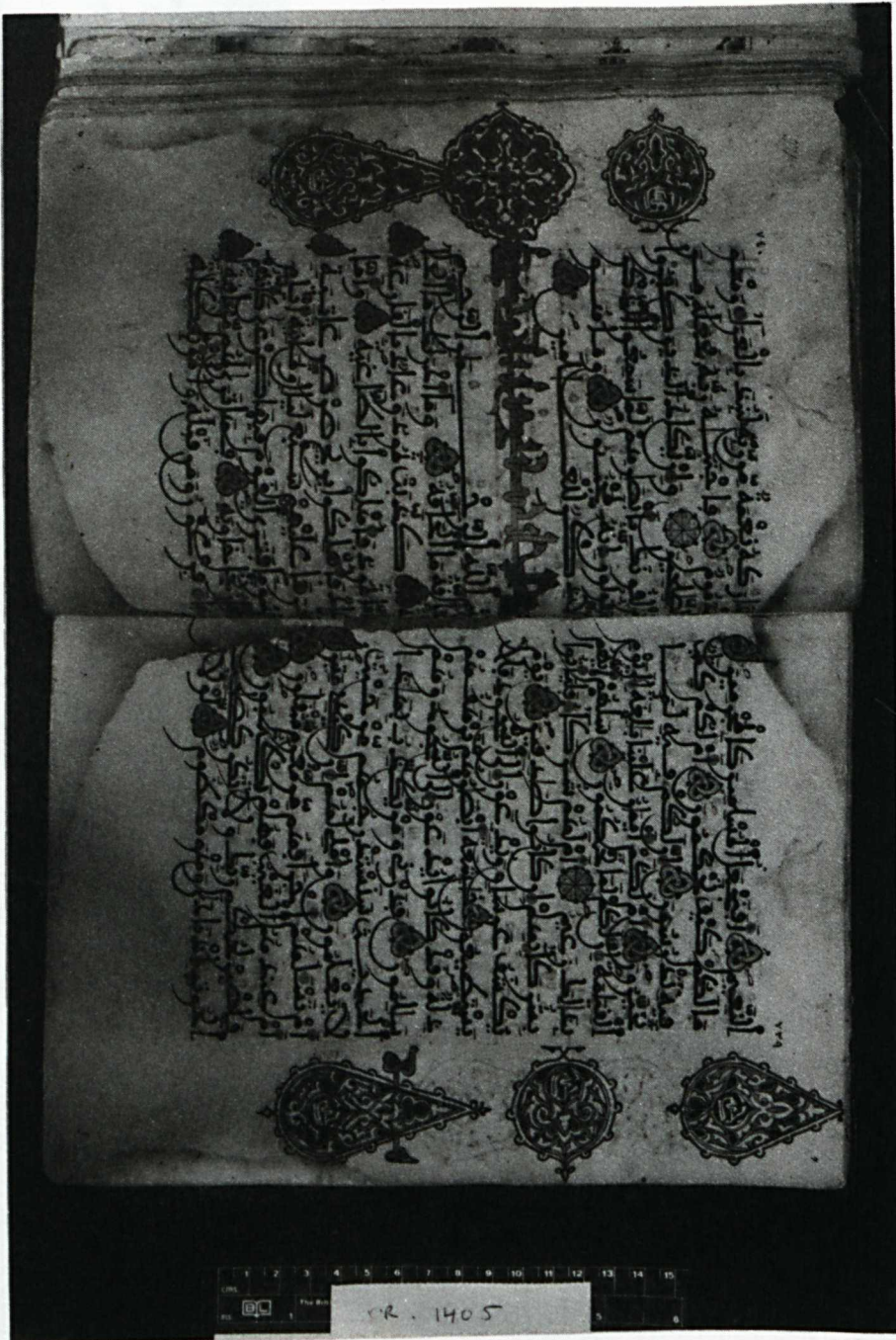
*A sculpture from Egypt, Thebes (25th dynasty c 750 BC) showing a high-ranking official depicted as scribe. His kilt is stretched tight and acts as support for the papyrus on which he is shown writing. Scribal equipment hangs from his left shoulder and an ink palette rests on his left thigh. (London, British Museum, Egyptian Antiquities, 1514).*



Wood slip inscribed with Chinese characters, from the Han period, 206 BC - AD 220 (London, British Library, Oriental Collections, Or. 8211.449).



A copper-plate forming part of the so-called Velvikudi grant AD 769/70. The grant is written in Sanskrit using Grantha script and in Tamil using Vatteluttu characters (London, British Library, Oriental Collections, Ind. Ch. 4).



*A page from a copy of the Koran written in Morocco in AD 1568. The chapter headings are in Western Kufic, the rest in Maghribi. (London, British Library, Oriental Collections, Or. 1405, f. 371v.)*