In order that the following paper on Chinese printing may be clearly understood, it is advisable to prefix it with a few general remarks on the structure of the Chinese language. The number and character of the symbols employed alone suggest difficulties which Gutenberg, Faust, or Schöffer had not to contend with in the 15th century.

It is probable that at a remote but indefinite period, before the Christian era, the first Chinese symbols used were hieroglyphic—being rude outlines of natural or artificial objects. A few are appended:

![Chinese Hieroglyphs](Old form).

- A "Hill."
- Elephant."
- "Child."
- "Sun."
- "Moon."
- "Horse."
- "Eye."

![Chinese Hieroglyphs](Present form).

In olden times when writing was accomplished by means of an iron stylus on bamboo or wooden tablets, circular strokes could easily be made; but latterly, when hair pencils were used with thin paper, writing became more difficult, and angular strokes and square forms took the place of curved or circular ones.

It must be very evident that the number of such pictorial representations was entirely disproportionate to the wants and uses of a language; consequently we find that by and bye more complicated symbols, combined with the intention of conveying a certain meaning were used. Below are some ideographic characters:

- A "tree" is 木; a couple put together stand for a "forest," thus 禾. The "sun" 日 above the "horizon," 旦 signifies "morning." A "mouth" 口 in a "door" 門 represents "to ask" 開. "To hurt" 害 and "eye" 目 in one character 瞎 denotes "blindness."

The characters: "body" 身 "behind" 躲 and "wood" 木 put together in one character 躲 convey the idea of "hiding."

After the hieroglyphic and ideographic comes the phonetic, which contains the great bulk of the characters in the language. They often consist of an imitative symbol attached to one which indicates the sound of the whole. The difficulties of pronunciation we will pass over for the present.

The number of different Chinese characters, according to Kanghi’s Dictionary, is 49,019 (according to some there are 45,000). About four or five thousand well selected characters are, however, all that is necessary for an ordinary student to know. About six thousand characters are sufficient for an ordinary missionary printing office, as there is a wide range of synonyms in the Chinese language. For magazine work, however, where various subjects are treated, about ten thousand different characters are necessary.

In a paper on Chinese printing the only classification of the characters which we need refer to is their grouping under 214 radicals. Each character contains a radical (which by itself is a character), the radical being placed generally at the left side; but, also, in many cases, on the right, top, or bottom; sometimes in the body of the character. Without this arrangement according to radicals, the type cases now adopted for Chinese work would have been impossible.

Besides the variation in the forms of the Chinese characters, there are various styles in which they are written. On the next page are given eleven different styles of writing ten different characters.

The first five (counting from the right side) are mostly fancy styles, and are called respectively by the Chinese: (1) luan fang shu; (2) muk kien wen; (3) chui yun chwan; (4) Sié tieh chwan; and (5) tai Ki chwan. The meaning of the equivalent Chinese characters lead us to associate the first with some fabulous bird, the second to some joiner-work arrangement, the third to suspended tassels, the fourth to a complicated oblique arrangement, and the fifth to the primum mobile, embodying the Chinese notions of the dual principle in nature and the universe.

The sixth (chuen shu) is generally known as the seal character, because it is used in seals and ornamental inscriptions. It comes next to the hieroglyphic style, and is the most ancient form of writing.

The seventh (li shu) was introduced about the beginning of the Christian era as an elegant style to be employed in engrossing documents.

The eighth (kiai shu) is the pattern style. No man can claim a literary name among his countrymen if he cannot write neatly and correctly in this style.
not generally used (席) we find that the radical is
chin (巾) "a napkin" or cloth; whilst in the com-
monly used character chi (纸) for paper, the
radical for "silk" is used, si (系).

Like many other Chinese articles, their paper is
made from bamboo. This rather unlikely material is
first well soaked, then thoroughly pounded, ground
or triturated, and taken up in moulds.

The present form of printing from blocks was adopted
from the discovery of Fung Tau, in the tenth century, of
taking impressions from engraved tablets. Regarding

The foregoing notes as to the growth, form, and
signification of the Chinese characters will amply serve
to shew the special conditions to be kept in view
when speaking of the invention and development of
Chinese printing.

As mentioned at the beginning of the paper, the first
Chinese records seem to have been written with a
sharp stylus, or iron point, on bamboo tablets. This
style proving too cumbersome, the hair pencil was
invented in the third century before Christ. With these
pencils the characters were written on silk or cloth
books; but as the cost of silk was very great, such
books were superseded about 105 A.D. by paper ones.

We find an interesting memento of the use of cloth
and silk in the manufacture of books in two forms of
the character chi for paper. In a form of the character
these tablets we find from A. Wylie’s introduction to
"Notes on Chinese Literature," that "between the
years A.D. 172 and A.D. 177 the classics were revised
by a literary commission, and engraved on stone tablets,
which were placed outside the National College; and
although it is probable that impressions were frequently
taken from these slabs, yet it may be a matter of
surprise that the hint thus afforded lay dormant for
so many ages before the art of printing, properly so
called, was fully developed." Truly, they had little
need for patent laws in those days, when from the
second to the tenth century the idea of block cutting and
printing lay on the surface, but remained unheeded.

The first step in wood block printing is to write the
characters upon thin paper, properly ruled with lines,
two pages (or one leaf) being cut on one block. A
heavy double line usually surrounds the double page. The title of the work, chapter, and paging are all cut in a central column, and when the leaf is printed it is folded through this column, so as to bring the characters on the edge and partly on both pages. In many type printed books, however, the titles and paging are so placed as not to be folded through the middle of the characters, but to serve as a useful side folio, which is easily read in turning over the book from the beginning (that is, what we call the end). Marginal footnotes are placed on the top of the page. When comments are greatly extended, they occupy the upper part of the page, being separated from the text by a heavy line. When, however, such comments are brief, they are inserted in the same column as the text, generally in double columns and smaller type.

When the leaf has been written out as it is printed, it is pasted on the block, face downwards. The wood ordinarily used is pear or plum; the boards being half or three quarters of an inch in thickness, and planed smooth for cutting on both sides. When the paper has dried on the board it is carefully rubbed off with the wetted finger, leaving every character and stroke plainly delineated. The engraver then cuts away all the blanks round about and inside the characters, after which the block is ready for printing (excepting, of course, altering or substituting for wrong characters, which is done very neatly by the engravers).

The block is laid on a bed of paper, and firmly fixed, so that there is no moving or chafing of the characters on the under-side (because, as before mentioned, for economical reasons, both upper and lower sides are used for engraving purposes, also because the printing on each side prevents partial and one-sided washings and consequent bending or warping of the blocks). The printer, seated before this bench, has on one side the pile of paper to be printed, on the other the printing press (made from the fibrous bark of the gomuti palm), whilst the pot of ink is placed in front, beside the wooden block. Taking the ink brush, he slightly rubs it across the block twice in such a way as to equally ink it; he then places a sheet of paper across the inked block; over this he lays other two, which serve as a tympanum. One or two sweeps across the block with the pressing brush completes the impression, as the paper being soft and unsized, can only be printed on one side.

The ink in ordinary use is manufactured from lamp black, mixed with vegetable oil, and is ground by the printers themselves. It is very often characterised by a most disagreeable smell. A pile of newly printed native books can often make the atmosphere of a room uncomfortably tainted. The odourless nature of our books is often a drawback, as the Chinese are inclined to think they get less value for their money. The suspicious celestial often plunges his olfactory organs within the leaves of a book he has been asked to buy, so that by his nose he finds out whether it is foreign or not.

The next step to consider in the manufacture of a Chinese book is the binding. Each double page is folded through the central column referred to before (blank side inwards, of course). In folding, the book-binder has for a guide a double mark, converging where the fold ought to be made, shaped thus... This is called “Yü wet” 魚尾 (fish's tail), and is a perfect register mark and easy guide in folding.

The sheets are next collated in volumes, and after titles, contents, prefaces, etc., etc., have been properly placed, holes are punched down the back, and through these pieces of paper firmly rolled up are passed. The covers being now placed in position, the top, bottom, and back of the books are cut. (In Chinese binding the cover does not go over the back.)

The cutting is done by hand, the instrument used being a large-bladed, keen-edged, and heavily backed knife, somewhat resembling a headman's axe, excepting its being short in the handle. Placing his foot on the top board, which compresses fifty or more volumes, and also serves as a guage, with several sweeps he neatly trims all the edges, excepting the front, of course, where the fold is made. The books are now separately stitched—thread or silk being used; silk cloth is also used at the top and bottom, to prevent fraying of the leaves at the back.

The arrangement of the Chinese book is as follows: Beginning at the end, according to our Western ideas, we find, in the upper left-hand corner of the cover, the outside title. This is often printed in “seal” characters. Next (going backwards, according to our ideas) we find the title page. In the middle is the title in large characters. The year of the reigning Emperor is put in the upper part of the left column; below is generally the name of the printing establishment where the book is printed or published. In Christian publications the top of the right hand column is filled with the date, according to our calculation:—“Jesus descended to the world, one thousand, eight hundred, and nineteenth year.” Below this we often find the author's name. The next pages, as a rule, filled up with prefaces, introduction, and index. Then comes the ordinary letterpress. The characters read from the top to the bottom of the column, and the columns read from the right to the left.

We will now look at the history of moveable metal or wooden Chinese types. In the book called the “Middle Kingdom,” by Mr. S. Wells Williams, we find that “the honour of being the first inventor of moveable types undoubtedly belongs to a Chinese blacksmith, named Pi Shing, who lived about A.D. 1000, and printed books with them nearly 500 years before Gutenberg cut his matrices at Mainz. They were made of plastic clay, hardened by fire, after the characters had been cut on the soft surface of a plate of clay, in which they were moulded. The porcelain types were then set up in a frame of iron, partitioned off by strips, and inserted in a cement of wax, resin, and lime to fasten them down. The printing was done by rubbing, and when completed the types were loosened by melting the cement, and made clean for another impression. This invention seems never to have been developed to any practical application in superseding block printing.”

The next step is a backward one, as later on we find mention of metal characters, each especially cut, and no mention made of a matrix. The following facts
are gleaned from the introduction to A. Wylie's "Notes on Chinese Literature." In the latter part of the 17th century the huge accumulation of books, ancient and modern, numbering six thousand vols., under the title "Koo kin too shoo tseh ching," was printed in the Imperial Office, by moveable copper types. After a while the greater part of the font having been purloined, and the remainder melted up, a set of moveable wooden types was made under the same direction, for the purpose of printing the immense collection known as the "Sze koo tseuen shoo," the printed catalogue of which contains about 3,449 separate works, comprising upwards of 78,000 books; besides 6,754 other works in 92,242 books, not included in the reprint.

The only other particulars regarding the use of moveable type by the Chinese (apart from these now made from foreign moulds), are taken from a letter sent to the North China Daily News, by Rev. A. Elwin, of the Church Missionary Society, in which he gives an account of a visit paid to an old Chinese printing establishment, in a place called Wang-do-fang, in the Chu-ki district, about sixty miles directly south of Hangchow. The printing was being temporarily carried on in the large ancestral temple connected with the village. In the large central hall of the temple were placed about twenty ordinary square tables. On the tables the cases of type were spread out very much after home methods, but of course taking up a great deal more room. When Mr. Elwin entered the hall, one man was engaged in setting up type, another was printing. The man setting up the type stood before a table, upon which was placed what may be called a Chinese "chase." It was a solid block of hard wood about twenty-two inches long by fifteen broad, and perhaps three deep. The inside of this block was hollowed out to a depth of one quarter of an inch, and this depression was still further hollowed out into grooves about three quarters of an inch deep. The block, Mr. Elwin saw, had twenty-nine of these grooves, each groove being filled to the depth of a quarter of an inch with ordinary thick clay. With his "copy" before him, armed with a small pair of iron pincers, the man began his work, character after character being transferred from the case and firmly pressed into the clay. When the "form" was complete, a flat board was placed on the top and the characters pressed perfectly even and level with the surface of the wooden block, the edge of which was cut to form the border, which is generally found round every Chinese page. This edge was of course immoveable and would be the same on every sheet printed from that "form." All was now ready for the printer. He having received the "form," carefully brushed the ink over the type. He then took a sheet of paper, laid it on the "job," and pressed it down all over so that it might be brought into contact with every character. He then removed the sheet and examined each character; some were not quite straight, these were carefully adjusted with the pincers. As far as Mr. Elwin could see, the type was never touched with the fingers.

After sufficient copies had been struck off, the type was "distributed," each character being returned to its particular "box." The type in the "form" was of three sizes; but instead of being adjusted by spaces, each character was kept in position entirely by the clay upon which it stood. The characters were square, and made of some hard wood. The men told Mr. Elwin that the art of printing in this particular way had been handed down in their family from the Sung dynasty, more than 600 years ago; no stranger was allowed to take part in it, apprentices being always chosen from their own clan. Their terms for printing were a hundred cash (about a shilling) a day, this to include use of type and ink; paper would be charged extra for. It seems to be the custom at Chu-ki, if printing is required in any particular place, as in this instance, for the printing of family registers, to hire the printers, who bring their type and set up their printing establishment on the spot. Through the kindness of Mr. Elwin I succeeded in getting a quarter of a fairly large sheet printed by the establishment referred to. The type seems well cut, and is, on the whole, regularly arranged. From the appearance of the sheet, I should surmise that the use of clay, and the taking of impressions by rubbing, will entail the risk of slurring.

We will now look at the modern history of the manufacture of Chinese moveable types.

The first modern founts were made by P. P. Thomes, for the East India Company's office at Macao, in 1815, for the purpose of printing Morrison's Dictionary. The characters were cut with chisels on blocks of type-metal or tin; and though it was slow work to cut a full fount, they gradually grew in number and variety till they served, before they were destroyed by fire in 1856, to print over twenty dictionaries and other works designed to aid in learning Chinese.

About the year 1836, M. le Grand, a type founder in Paris, prepared an extensive fount of type with comparatively few matrices, by casting the radical and primitive on separate bodies as shown herewith.

The small types show the radical and primitive separate, in the large types they are combined in one.

In 1838, the Royal Printing Office at Paris had obtained a set of blocks, engraved in China, from which thick castings were made, and the separate types obtained by sawing the plates.

In the same year, the Rev. Samuel Dyer, of the London Missionary Society, at Singapore, began to cut the matrices for two complete founts. At his death, in 1844, he had completed 1,845 punches. R. Cole, of the American Presbyterian Mission, continued the work, and in 1851 was able to furnish founts of two sizes, with 4,750 characters each.

Special attention ought to be given to the invention in 1859, by Mr. W. Gamble, of the Presbyterian Mission Press, at Shanghai, of matrices by the electrotype process. The plan adopted by him was to get the character cut on such suitable material as box wood. The electro is taken from the character itself, or through the ordinary medium (with some necessary changes) of a wax mould. The mould is then kept in the depositing trough containing the copper solution
for several days. When the copper deposit is thick enough, it is trimmed and fixed in a brass holder. On account of the length of time allowed for depositing, the thickness of the copper renders unnecessary the ordinary backing of the "shell." By this process the characters are more finished and possess more of the caligraphic excellence prized by the Chinese than could be obtained by the use of steel punches. To Mr. Gamble we are also indebted for the Chinese type case, arranged according to radicals, now in common use in Chinese printing offices. To help in thoroughly understanding this structure, we present herewith a sketch (from a photo.) of one of these type cases:

![Chinese Type Case, containing fully 9,000 Characters.](image)

This arrangement of Chinese type cases was adopted after much careful calculation, as to what characters are really in use, and their proportion or frequency of use. Of course different kinds of Chinese work require more or less variety in number of characters, so that some cases are made larger, others smaller. In this case the old saying comes true: "Circumstances alter 'cases.'"

It is interesting to notice that while westerners have thus improved methods of Chinese printing, the Chinese in the outports have very readily taken to English printing. In the foreign settlement of Shanghai there are quite a number of native printing offices, where a large amount of work is done for business houses and others who prefer cheapness to excellence. I need not refer here to the ludicrous mistakes they make, or to their many makeshifts, some of which are ingenious in their way. Some of the better offices have plates and cylinder printing machines, whilst others work away with old presses and antiquated ruling machines. This information regarding English printing done by Chinese is merely given by the way, as our subject is "Chinese Printing."

My remarks on modern Chinese printing would not be complete did I not refer to the extensive use of photo-lithography by the Chinese. In Shanghai there are quite a number of such establishments; and we can hardly wonder at this, as photo-lithography so easily reproduces the beautifully written Chinese characters, and offers a good opportunity of reprinting, at a cheap rate, many of the hitherto unattainable and very expensive old Chinese works.

In one of these establishments, in Shanghai, I found in a well lighted hall, seven huge cameras, on rails to facilitate focussing, &c. At each end of the building were five dark rooms for developing. In the machine room were thirteen transfer presses, at which men were busy with their scrapers removing superfluous marks; there were also nine lithographic cylinder machines, driven by a large steam engine, at a high rate of speed; Chinese printing and binding, as we have shewn, do not, however, require careful feeding. From what I have observed, such photo-lithographic establishments are mostly used for reprinting old
learned and the learner, for the old and the young; books treating on all manner of subjects from a Christian standpoint, and the demand still increases. We find to meet this that the number of mission presses is increasing, and I believe that by mutual co-operation the output of Christian literature in China may be greatly enlarged. Mission presses away in the interior, worked by pupils at mission schools, where there is scarcity of type and other materials, could get stereo and electro plates from central mission presses, and be able to turn out books and tracts when they wish, and in whatever quantities they require. Many

literature have done much by improvements, specially in the manufacture of moveable type, to give a great impetus, and to a certain extent work a revolution in Chinese printing. And this is what might have been expected, as in all great reformation work, since the art of printing was invented, printing has proved a mighty factor in the onward march of civilization. The splendid work done by the Bible and Tract Societies in China, aided by home societies, shows what a power the press is in this land of hoary superstitions,—where, however, we also find a vigorous intellect and a vast heathen literature. Many hundreds of different books have been printed: books for the

GROUP OF CHINESE PRINTERS

At the office, at Shanghai, of the Society for the Diffusion of Christian Knowledge among the Chinese.

The portrait at the top on the extreme right-hand is MR. GILBERT MCINTOSH, Superintendent.

[This article is condensed from the paper by Mr. McIntosh, read by Mr. J. Renfrew before the Glasgow Branch of the British Typographia. We are indebted to Mr. D. C. Coghills for the loan of the MS. and for the Chinese characters used therein, as well as for the photographs from which the illustrations were produced. Mr. McIntosh was formerly a member of the staff of Messrs. Aird & Coghills's office, Glasgow, and is now engaged as the Printing Manager of the American Presbyterian Mission Press, Shanghai.]