

CHINA'S GIFTS TO THE WEST

Prepared by Professor Derk Bodde for the Committee on Asiatic Studies in American Education
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Introduction

An exercise identifying Chinese inventions that we use and enjoy in daily life provides an excellent starting point for discussing both the achievements of the Chinese civilization and China's influence on the West. The article *China's Gifts to the West* describes China's inventions of **silk**, **tea**, **porcelain** ("china"), **paper**, **printing**, **gunpowder**, **the mariner's compass**, **medicines**, **lacquer**, **games** (including cards, dominoes, and kites), and miscellaneous items such as **umbrellas**, as well as natural resources, such as **plants** (including peaches, apricots, and citrus fruits) and **minerals** (including coal and zinc), first discovered and cultivated by the Chinese.

Lesson Ideas:

For homework, have the students look up several items on the above list in an encyclopedia to see if they can identify their origin. Then use the article *China's Gift to the West* to enrich the story of how each invention was brought to the West.

A second approach might be to assign individual students one invention to read about in *China's Gift to the West* and report to the class. A separate chapter is devoted to each of the items/inventions in the list above.

Foreward

In 1940 almost 10,000 new books were printed in the United States. Millions of copies of the 13,000 newspapers in the country were distributed. All of this was possible because we know how to make paper and to print with movable type — inventions which occurred in China. The world's first printed book, which is pictured below, was made in China, 1,074 years ago.

As late as 1923 soy beans were practically unknown in the United States. But in 1940 there were over 79,000,000 bushels of soy beans grown on the farms of this country. The soy bean crop that year was worth over \$60,000,000, and was used to make bread, crackers, soups, steering wheels and dashboards for automobiles, plastic combs and brushes, and hundreds of other articles. The soy bean plant came to us from China. So did peaches and apricots and chrysanthemums, and scores of other plants.

We have all read about "our debt to ancient Greece and Rome" and about "our heritage from Europe." We need to think also about our gifts from the cultures and peoples of Asia. This pamphlet tells of some of the things given by China to the Western world.

The story of China's gifts to the West goes back hundreds and hundreds of years. When Columbus came to America, China had already been exchanging goods with Europe for centuries.

When one knows the story of these gifts from China one appreciates more deeply the importance of the Chinese to our ways of living in the United States. And one realizes the importance of closer, friendlier cooperation among all peoples and nations. One realizes the great importance of the countries of Asia to the welfare and advancement of life in America and the rest of the world.

China has given much to the world. Other nations have also given much to China. And the exchange of discoveries and inventions and products has not stopped. There will be richer ways of living for all of us as, in the future, the nations of Asia and the nations of Europe and America draw closer and closer together. This article brings together authoritative material on *China's Gifts to the West* not otherwise available in small compass. It is worth the consideration of all citizens and teachers who recognize the mounting importance of close relations between East and West. The long-continuing influence of Asiatic culture on Western civilization becomes clearer as one reads Dr. Bodde's document. The materials he presents offer substance and content for increasing and improving Asiatic studies in our schools, colleges, and agencies of adult education.

The article is of direct and special value to teachers of social studies and the humanities. In classes in these fields — especially in surveys of world history — it offers material for basic reading for entire classes or for special reports from interested pupils. The article is an excellent guide for teachers who seek to "filter" Asiatic materials into existing courses; for that purpose, it contains valuable suggestions for teachers of science, shopwork, and the arts as well as of social studies and humanities. Teachers of intermediate grades and student groups responsible for assembly and club meetings will find here useful materials for dramatization and for programs.

The American Council on Education has long stressed the importance of the international situation for American education. The appointment of a Committee on Asiatic Studies in American Education in 1941 is one outgrowth of the Council's concern in this field. Among the most neglected areas for comprehensive understanding of the world picture are the vast reaches and peoples of Asia. The Committee on Asiatic Studies has sought to aid schools in increasing and improving the Asiatic content of school curricula.

The Committee on Asiatic Studies in American Education is deeply indebted to Dr. Bodde for his preparation of the manuscript and to the Rockefeller Foundation for making its publication possible. This article is the first of a series now in preparation, intended as a contribution to the friendlier understanding of Asia on the part of American citizens.

Howard E. Wilson, *Chairman*
Committee on Asiatic Studies in American Education

China's Gifts to the West: Introduction

China has oceans to her east, steppes and deserts to her north and northwest, and mountains and jungles to her west and south. She has long seemed to be an outstanding example of isolation. Yet the Chinese succeeded long ago in breaking through these geographic barriers and opening trade routes to link their country with the outside world. As long as hundreds of years ago, materials and inventions and ideas traveled between China and the civilizations of India, Persia, Egypt, Greece, and Rome. Throughout the Middle Ages contact between China and the countries of Europe continued. In modern times the contact has increased. China has never been as isolated as we have often assumed.

The earliest of the trade routes between China and the outside world was a route for caravans. It led overland from Northwest China across the deserts of Central Asia (Turkestan), through Persia, and on to the shores of the eastern Mediterranean. From Central Asia, a branch which passed southward through Afghanistan, linked China with India. It is the route westward to the Mediterranean, however, with which we are here concerned. The Chinese conquest of Turkestan in the first century B.C. made it possible for caravans to carry goods over this road between China and the Mediterranean. Until 500 years ago it was the most important line of contact between China and the rest of the world. Over it passed many travelers, among them Marco Polo when he journeyed from Europe to reach China in the year 1275.

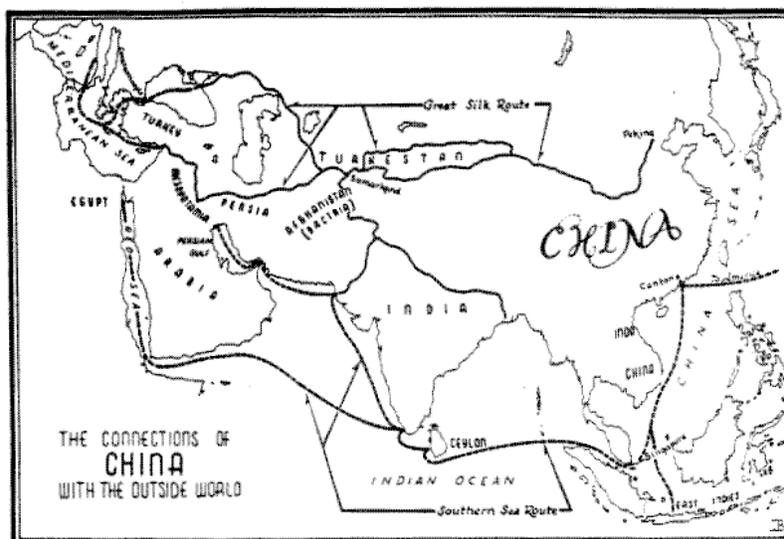
The second major trade route was the southern sea route by way of India. At its western end the route began either at the Red Sea or the Persian Gulf. It went south and then east across the Indian Ocean to India and Ceylon, from there around the tip of Malaysia past the present Singapore, and up along the coast of Indo-China to Canton and other southern Chinese ports. The Chinese end of this route was opened in the second century A.D., but did not attain real importance until the coming of Arab ships to the Far East in the seventh century. In still later times the Chinese replaced the Arabs as the main seafarers between China and India. They developed the sea route so that it rivaled and at times even surpassed the overland road by caravan. When the Portuguese, Dutch, English, and others came to China from the sixteenth century on, this sea route became the main road to the East. Trade on the overland route declined. Ships had proven superior to camels as carriers of trade.

A third route approached China from the ocean side — across the Pacific Ocean by way of the Americas. This route became very important in the nineteenth century after the United States gained its independence. With the development of the New England clipper-ship trade with China, the route became as important as the older Indian Ocean route. Trade lines across the Pacific are in modern times a prime factor in the close and friendly relations between the United States and China.

For more than two thousand years, goods and ideas have been carried between China and the Western world by these three routes. China has contributed much to the Western world, and Europe and America to China. The story to be told here deals only with the gifts from China to the West. These contributions have influenced very greatly the development of Western civilization. For the two thousand years between 200 B.C. and A.D. 1800, China gave to the West more than she received in return.

It is difficult for the historian to trace in detail the path of ideas from one region to another. It is easier to trace the route of material things as they pass from one center of civilization to another. China has given many ideas and ideals to the rest of the world; she has also given certain material goods or inventions or discoveries — silk, porcelain, tea, paper, printing, gunpowder, the compass, lacquer, medicines, plants, kites, playing cards, to mention only a few. The story of how these material gifts reached the Western world from China is a fascinating one. It is that story that this pamphlet tells.

Silk



Of all the products we think of as typical of China, silk seems to be the oldest. Traces of silk fabric have been found among remains which date back to the earliest historical Chinese dynasty, about 1300 B.C. It is possible, moreover, that the use of silk in China goes back even earlier to prehistoric times.

Until the second century B.C., silk remained an article known to the Chinese alone. But in that century an event occurred which was of immense importance for East and West alike. At that time certain fierce tribes of nomads in Mongolia were making constant attacks upon the Chinese. These nomads were the same tribes of Huns who later were driven west by the Chinese and invaded Europe. In order to meet these attacks from the Huns, a diplomatic mission, headed by a man named Chang Ch'ien, was sent forth by the Chinese Emperor in the year 138 B.C. The mission sought to cross the arid wastes of Turkestan, in order to find and make an alliance with a certain friendly tribe in the west. The Chinese thought that this alliance might help to defeat the Hun raiders.

Soon after leaving China, Chang Ch'ien and his band of a hundred men were captured by the very Huns against whom his mission was directed. For ten long years he was held prisoner. Then, making his escape, he pushed dauntlessly westward once more. Finally he reached what was then Bactria, a country in the extreme west of Turkestan, where he found the tribe that he had been sent to visit. They treated him with friendship, but showed no desire to join an alliance against the dreaded Huns. So Chang Ch'ien retraced his steps, only to suffer the misfortune of again falling a prisoner to the enemies. This time, however, he succeeded in escaping after a single year of captivity. In 126 B.C., twelve years after his departure, he returned to the Chinese capital, accompanied by but one of the hundred men who had started with him.

Chang Ch'ien's mission was a failure from a diplomatic point of view. But he brought back with him two important plants of western Asiatic origin. One was alfalfa, which was to prove of the greatest value to the Chinese as food for the horses used in their later military campaigns against the Huns. The other was the grape, which has ever since been one of China's favorite fruits.

Most important of all, however, Chang Ch'ien gave to the Chinese their first accurate knowledge of the expanses of Central Asia. Following his advice, they launched a series of military campaigns which during the next century broke the power of the Huns. Finally all of Turkestan was brought under Chinese rule. Across the desert the Chinese conquerors laid out a series of garrison posts. Thus, well before the birth of Christ, a trade route was established which crossed Turkestan from China, passed through Persian territory, and reached the eastern shores of the Mediterranean. From there ships could continue the journey to Rome itself. Thus were Rome and China, then the two most powerful empires in the world, linked by trade.

The most important product sent by China over this route to Rome was silk. Because of its high value and light weight, silk was ideal freight for the caravan trains of the long, long road. So much silk was carried over this route that it has since been commonly known as the great Silk Road.

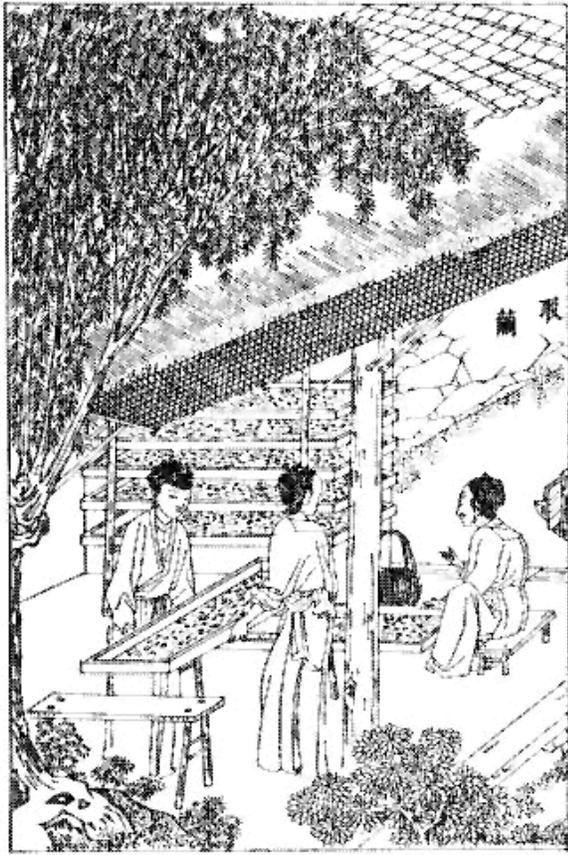
In return for silk, the Roman Empire sent to the Chinese precious stones, wool textiles, asbestos, and — of greatest importance from a cultural point of view — glass, which is of western Asiatic origin. Yet none of these products could balance in value the precious silk. Woven into a semitransparent gauze, silk became the fashion among the ladies of Rome. In some periods of history silk was literally worth its weight in gold by the time it reached its destination. In fact, the Romans used so much silk and other Asiatic luxuries that during the first two centuries A.D. Rome suffered an adverse trade balance with Asiatic countries estimated to equal no less than half a billion United States dollars. One writer, indeed, has even gone so far as to suggest that this unfavorable trade balance was one important cause for the downfall of the Roman Empire.

After the collapse of Rome in A.D. 476, the silk trade was continued with Byzantium (Constantinople), the leading center of European civilization during the Middle Ages. During all this time, however, Europeans had no clear idea of how silk was produced. The Roman poet, Virgil (70-19 B.C.), for example, described silk as some kind of a vegetable product that is combed from trees. The Chinese, we may be sure, jealously guarded the methods of making silk. It was a valuable "trade secret."

About the middle of the sixth century, however, some monks arrived in Constantinople from the East, bearing the startling news that silk was not "combed from trees," but was produced by caterpillars. With the Byzantine Emperor's encouragement they were sent eastward once more to bring back the secret of silk. Some time between the years 552 and 554, they returned triumphantly to Constantinople, bringing with them some precious silkworm eggs which they had smuggled out of the country inside a bamboo cane. From these few eggs are descended the countless millions of silkworms that have since been grown in Europe.

Today, most European silk is made in Italy and France. The Far East, however, continues to produce the vast bulk of the world's supply. In recent decades Japan, using improved methods of large-scale production, has taken the lead from China in the manufacture of silk. Some of the silk produced in China, nevertheless, retains the high qualities of that produced in former times. When peace comes and China recovers from the ravages of war, it is quite possible that silk may again become one of her leading exports.

These pictures are taken from a series on silk making found in T'ien-kung k'ai-wu, a Chinese book originally printed in 1637 and reprinted by the Commercial Press, Shanghai, in 1927. A copy of this book may be found in the Asiatic Division, Library of Congress.



Feeding of Silkworms



Preparing Cocoons



Weaving of Simple Cloth



A Textile Workshop

Tea

Before tea was domesticated, it probably grew wild both in southwestern China and in northern India. Some people have supposed that tea was one of the many things brought from India to China by Buddhist disciples. The Hindus, however, have never been great tea drinkers. They drink only a little tea even today, although large quantities of tea are now grown in India for sale in the West. All probabilities seem to point to China as the first country in which the habit of tea drinking developed.

The earliest authentic reference to tea drinking in Chinese literature is one that occurs in the biography of a well-known Chinese historian. It can be dated between the years A.D. 264 and 273. This historian had the misfortune to hold office under an emperor notorious for his drunken sprees. In the early part of this emperor's reign, so the biography tells us, the historian enjoyed the favor of the new ruler. Frequently he was invited to attend drunken feasts at which each guest was expected to drink no less than seven Chinese pints of wine. Our poor historian, alas, suffered bad health, which made it hard for him to keep up with his merry companions on these occasions. His own drinking capacity, the biography adds, was only three pints.

It is at this point that the biography mentions tea. In order to help the historian out of his difficulties at one such party, a kind-hearted friend "secretly gave him some tea to take the place of wine." Perhaps this trick was found out. At any rate, so the biography says, the historian later fell into the bad graces of the emperor, was thrown into prison in the year 273, and soon afterward was put to death.

In earliest times the Chinese seem to have used tea only as a tonic or medicine. For some time it was regarded by many of them with the suspicion people anywhere usually have for any unfamiliar food or product. Thus a Chinese book dealing with marvels and wonders of all kinds, and written within twenty years following the incident of the unfortunate historian, lists tea under a special section devoted to "Foods to be Avoided." It sternly warns the reader that "the drinking of true tea will cause people to suffer lack of sleep!"

Several centuries passed before tea became really popular in China. Gradually its use spread to such neighboring countries as Tibet, Mongolia, Korea, and Japan. Only much later did it spread in any great quantity farther afield. In the seventeenth century, travelers who had been in China brought it back with them on

their return to Western Europe. They and their tea traveled from China over the southern sea route by way of India. Pepys, in his famous diary, wrote in London on September 25, 1666: "I did send for a cup of tee, a China drink of which I never had drunk before." Within the next century the demand for it had become universal in England. Tea was becoming an important item in world trade.

Meanwhile, the Russians early in the seventeenth century were also becoming acquainted with tea. They received it, however, by way of the overland route through Central Asia. In course of time they became even greater tea drinkers than the English.

The different names for tea in various European languages are an interesting reflection of the two routes taken by it in its travels to the West. Thus the English word tea and the French thé are both derived from the Chinese *té*. This is the name for tea in the dialect of the southern coastal province of Fukien, from which ships started westward on the southern sea route. The Russian word, *chai*, on the other hand, is derived from *ch'a*, which is the way the word for tea is pronounced in North China, where the land route through Central Asia started. Other similar words, also derived from *ch'a*, are used by the Mongols, Turks, Persians, and modern Greeks.

From England tea was brought to this country. Its connection with the American Revolution in the form of the "Boston Tea Party" is known to us all. In the first half of the nineteenth century it was the most important single item brought back from Canton around Cape Horn by the Yankee sea captains in their famous clipper ships. In the latter part of the nineteenth century, however, tea growing became a major industry in India, Ceylon, the East Indies, and other regions, and the trade with China declined. Yet even today the most delicate varieties of tea (and there are dozens of them) still come from China.

Porcelain

Porcelain, as indicated by its popular name of "china," is another major product of China. Earthenware bowls, plates, and vases have been baked from clay by almost all people since time immemorial, but porcelain is justly acclaimed as a product of Chinese genius alone. True porcelain is distinguished from ordinary pottery or earthenware by its hardness, whiteness, smoothness, translucence when made in thin pieces, nonporousness, and bell-like sound when tapped. The plates you eat from, even heavy thick ones, have these qualities and are therefore porcelain. A flower pot, on the other hand, or the brown cookie jar kept in the pantry are not porcelain but earthenware.

Two mineral ingredients are necessary to give porcelain its peculiar characteristics. The first is the white clay known as kaolin. It is an aluminum silica compound which takes its name from the Chinese term *kao-ling (gow-ling)*, meaning "high hill." The latter is the name of a place where the clay was obtained in early times, lying twenty miles northeast of the famous porcelain kilns at Ching-te-chen in Central China. The second essential ingredient in porcelain is petunse, a mineral resembling kaolin, but more glassy in character. Its name originates from the Chinese term *pai-tun-tzu (by-doon-dse)*, meaning "white bricks." The name describes the brick-like blocks into which this mineral is kneaded by the Chinese porcelain workers before being mixed with kaolin, shaped into various objects, and then baked to become porcelain.

The word *tz'u*, which is the present-day Chinese term for porcelain, occurs for the first time in the poem of a Chinese writer who died in the year A.D. 300. This poem speaks of a wine pot which is said to be of "blue-green tz'u." Yet it is unlikely that the new word here refers to a genuine porcelain. Several centuries were still to elapse before patient experimentation gradually evolved the real porcelain with which we are familiar today.

In this experimentation it is probable that Chinese alchemists played a vital part. In their eager search for the elixir of immortality, they carried on constant experiments with many kinds of minerals, of which kaolin seems to have been one. Thus kaolin is mentioned in Chinese literature as a medicinal drug before it is referred to in connection with porcelain itself. Incidentally, it is not at all impossible that this Chinese alchemy was the inspiration of the alchemy of the Arabs and, through it, of medieval European alchemy, from which our modern chemistry eventually comes.

The first description that seems to point definitely to porcelain is that of the famous Arabic traveler, Suleyman, in his account dated 851 of travels in India and China. There he speaks of certain vases made in China out of a very fine clay, which have the transparency of glass bottles. In the centuries following Suleyman's time the southern sea route to China rose to a position of commanding importance. Over it porcelain became by all odds the major export shipped from China to the outside world. Tremendous quantities of porcelain went to Southeast Asia, including the Philippines, Indo-China, Siam, Malaya, the East Indies, Ceylon, and adjoining regions. Much porcelain went even farther, crossing the Indian Ocean and passing up the Persian Gulf to reach Persia, Syria, and Egypt. Some of it, too, went as far as the southeast coast of Africa, where its presence has been used by modern archaeologists as a means for dating certain recently discovered sites of Negro cultures.

From the fifteenth century on porcelain appeared in Europe in steadily increasing quantities. In the sixteenth century attempts, only partially successful, were made in Italy to imitate the marvelous product. Our word, porcelain, which comes from the Italian *porcellana*, is a memory of these attempts. This word originally referred in Italian to a small kind of white conch shell, from which porcelain was at first believed to be made.

It was only in 1709, however, that true hard porcelain was successfully produced in Europe, and this through a curious accident. For nine years before that date a German artisan, named Frederick Böttger, had been trying to make porcelain. His patron was Augustus the Strong of Saxony, and he worked at Meissen, a few miles outside of Dresden, which was later to become famous for its "chinaware." This was the period in Europe when most people wore wigs which were whitened with a powder. In 1709 Böttger happened to notice that the hair powder he was using was peculiarly heavy. Investigating the reason for this heaviness, he discovered that it was caused by the presence of kaolin. From this kaolin he succeeded in producing the first hard porcelain ever made in Europe.

A porcelain works was straightway established at Meissen by Böttger's patron, Augustus. He became so enthusiastic over the new discovery that he wished it to be used even for the making of chairs and tables. As in the case of many other new inventions, the process was at first a jealously guarded secret. The artisans were sworn to absolute secrecy and operated their kilns behind high walls, where they lived as virtual prisoners. In 1718, however, one of them made his escape

to Vienna, where he brought the precious secret. The following decades saw the rapid erection of porcelain works in France, Holland, England, and other countries.

Thus European porcelain came as an independent invention — an invention, nevertheless, directly inspired by examples of Chinese porcelain, which had been closely studied by Böttger during his years of experimentation. Most of the eighteenth century products of European kilns, moreover, closely imitated Chinese wares in their techniques, shape, color, and design. Especially is this true of the famous blue-and-white ware of Delft, Holland. The early examples of delftware often amazingly resemble the "willow pattern" and other designs commonly found on Chinese porcelain. Despite the enormous amount of porcelain since produced in Europe and elsewhere, however, the best work of the Chinese potter has never been successfully equaled outside the land of its origin.

Paper

Of all Chinese contributions to the Western world, none can be more clearly traced in its beginnings in China, and then in its gradual spread across Asia to Europe, than can paper. In early times Chinese books were made of narrow vertical strips of bamboo. Many of these, tied together into a bundle formed one volume. The bulk and clumsiness of such a writing material is obvious. A Chinese philosopher of the fifth century B.C., Mo Tzu, by name, used to take along with him three cartloads of such bamboo books wherever he traveled. For writing small documents the Chinese used strips of silk. These were more convenient, but were too expensive for general use. Clearly a new writing material was needed.

The formal invention of paper can be dated exactly in the year A.D. 105, and was the work of one who should surely be honored among the great contributors to human civilization. He was Ts'ai Lun, a man attached to the Chinese imperial court. Ts'ai Lun's biography in the history of his time describes his invention as follows:

In ancient times writing was generally on bamboo or on pieces of silk, which were then called *chih* [a Chinese word pronounced *jer*, which has since been used to mean paper]. But silk being expensive and bamboo heavy, these two materials were not convenient. Then Ts'ai Lun thought of using tree bark, hemp, rags, and fish nets. In the first year of the Yuan-hsing period (A.D. 105) he made a report to the emperor on the process of paper making, and received high praise for his ability. From this time paper has been in use everywhere and is called the "paper of Marquis Ts'ai."

There is good reason to suppose that previous attempts to make paper, using raw silk, had already been going on, possibly as early as the third century B.C. What Ts'ai Lun seems to have done, however, was to develop an easy process for manufacture and, above all, to substitute cheaper materials in the place of the expensive silk. His achievement put paper within the reach of everyone.

Following Ts'ai Lun's invention, paper spread with amazing speed throughout all the lands under Chinese domination. Thus in the arid deserts of Chinese Turkestan the world's earliest surviving examples of paper have in recent times been found. They date from within fifty years of Ts'ai Lun's death. In this and following centuries we find the Chinese doing almost everything with paper that was in later times to be done in other countries. Rag paper and hemp paper, paper of various plant fibers and of cellulose, paper sized and loaded to improve its quality for writing, wrapping paper and even paper napkins and toilet paper — all these were soon in general use.

From Central Asia paper pursued its triumphant way westward into the Arabic world, where its first manufacture can be exactly dated in the year 751. In that year, according to Arabic annals, at Samarkand, in the extreme west of Turkestan, the Arabs defeated a Chinese army and captured some of its soldiers. From some of them, who had formerly been paper makers, the Arabs first learned how to manufacture paper.

From Samarkand papermaking spread throughout the Arabic Empire, reaching Syria, Egypt (where it displaced papyrus), and Morocco. From there it finally entered Europe by way of Spain, where its manufacture is first recorded in A.D. 1150. From Spain, paper passed on to southern France, and the gradually to the rest of Europe, displacing parchment as it went.

The influence of paper upon the whole course of later Western civilization can hardly be overestimated. Without this cheap material it is unlikely that printing could ever have come into general use. Gutenberg's *Bible*, for example, which is probably the earliest European book printed from movable type, also happens to be one of the few books some of whose copies were printed on parchment instead of paper. It has been estimated that to produce one copy of the *Bible* on parchment, the skins of no less than 300 sheep were required. Had such conditions continued permanently, books would never have been available for more than the richest few, and printing might never have competed successfully with the older, and in some ways more artistic, process of copying manuscripts by hand. The debt of the world to Marquis Ts'ai is greater than the debt to many other whose names are better known.

Printing

The noble sequel to paper in China was printing. As in the case of most major advances in human civilization, this invention was not the work of any single individual. It came as a climax to several separate processes, developed over a number of centuries. One of these was the invention and spread of paper itself, the significance of which has just been described. Another was the development of a suitable ink.

A third was the process of making what are called rubbings or squeezes. This is a Chinese technique for obtaining on paper exact copies of inscriptions that have been cut on stone monuments and tablets. A sheet of moistened tissue paper is closely fitted upon the face of the engraved stone. The outer surface of this paper is then rubbed with an ink pad so that all parts of the paper touching the raised portions of the underlying stone are inked black. The parts of the paper that fit into the cutout depressions do not receive ink and are left white. Thus an exact black-and-white paper copy of the original inscription is obtained. The Chinese

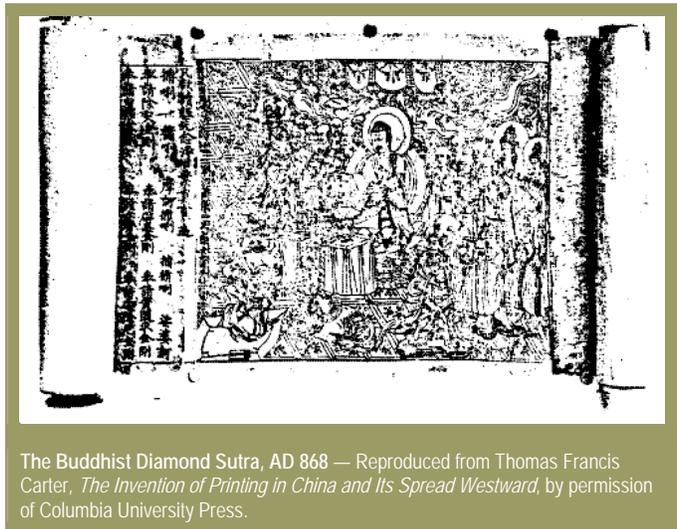
developed this technique of making rubbings because of their eagerness to obtain exact copies of their classics, which were often inscribed on stone monuments.

Most important of all the forerunners of printing was probably the Chinese use of stamp seals. Such seals first appear in human civilization in Mesopotamia, where seals with pictures on them played an important part in man's first development of a system of writing. In China seals began to be used about the third century B.C. At first they served the purpose, as in Mesopotamia, of personally identifying their owners. Even to this day, a Chinese, when endorsing a bank check in China, must not only sign his name, but also stamp the check with a personal seal bearing his name in printed characters. The seal of the author, which he used for this purpose when he lived in China, is shown under his name on the cover of this pamphlet.

In China, as in Mesopotamia, such seals were in the beginning used to stamp impressions on clay. From about the sixth century A.D. onward, however, the Chinese began to stamp their seals in ink, in order to print short inscriptions on paper, in a way similar to our modern rubber stamps. It is from such inked impressions that the true printing of later times gradually developed.

At about the same time, Buddhist and Taoist priests in China began to use such seals. Their seals were only a few inches square and were used to print magical charms and inscriptions by the hundreds. Here was first developed the idea of rapid duplication, an inherent principle of printing. All that yet remained to be done was to enlarge the size of such seals so that many rather than few words could be reproduced at one time. Then genuine printing would be at hand.

It is definitely known that actual books were printed in China during the ninth century, and probably such printing goes back considerably earlier. The world's oldest existing printed book is a Buddhist sacred text, dated in the year A.D. 868, and beautifully printed in Chinese characters. It was recovered some forty years ago from a cave in Northwest China, just at the point where the great Silk Road leaves China proper to plunge into the deserts of Central Asia. This book was not folded into pages like our modern books, but was a single roll of paper 16 feet long. Its dedication states that it was printed by a certain Wang Chieh "for free general distribution, in order in deep reverence to perpetuate the memory of his parents."



The Buddhist Diamond Sutra, AD 868 — Reproduced from Thomas Francis Carter, *The Invention of Printing in China and Its Spread Westward*, by permission of Columbia University Press.

Less than a century later comes the first example of really large-scale book printing in China. This achievement was the printing of nine of the major Chinese classics in 130 volumes. It was carried out between the years A.D. 932 and 953 under the direction of a famous official named Feng Tao. From this time onward the flood of printing became ever greater. One modern writer has even estimated that up to the year 1800, more books were printed in China than in the entire rest of the world put together.

All that has hitherto been described refers only to block printing, that is, to printing in which a single block of wood is engraved for each page of the book printed. The first invention of separate movable type, however, is also Chinese. It is the work of a simple artisan named Pi Sheng. Between the years 1041 and 1049 he made a font of movable type of baked clay. In later centuries types made from wood and from various metals replaced such clay types. The use of metal was particularly developed in Korea in the fifteenth century. In China, however, features inherent in the nature of the Chinese script, as well as certain social and artistic attitudes, long prevented movable type from gaining a popularity equal to that of block printing. Despite its early invention, therefore, such type has come into general use in China only during the last few decades.

At the same time that these developments in movable type were making their appearance in China and surrounding countries, the earlier Chinese invention of block printing was slowly pushing its way toward the Western world. From Turkestan it passed to Persia, where it was known in 1294, and then to Egypt. In Europe itself, we find that the earliest dated example of block printing is a small picture of St. Christopher, accompanied by two lines of text, which was made in the year 1423. Other similar undated pictures also exist, however, probably from a period a few decades earlier. Most of them came from southern Germany.

It is not likely that European block printing came as an independent development. Indeed, the beginnings of block printing in Europe can with good probability be traced to several Chinese influences. Among these may have been playing cards, which had long been printed in China, and which first appear in Europe in 1377. Another may have been the technique of decorating textiles by means of stamped designs, a technique which gained great popularity in Europe in the thirteenth and fourteenth centuries.

Most important of all, however, was probably the first European acquaintance with printed paper money. Such money began to be printed for the first time in world history in China during the tenth century. It was continued during the next two hundred fifty years, and taken over by the Mongols during their rule over China (1280-1367). Owing to several disastrous experiences with currency inflation, caused by inadequate metal backing for the paper money, the Chinese gave up its use after their expulsion of the Mongols in 1367. During the Mongol rule, however, paper money was being printed in China at the rate of no less than 37 million separate notes a year. Its use spread as far west as Persia, and it is admirably described by at least eight pre-Renaissance European writers, including Marco Polo. It is difficult to suppose, therefore, that among thoughtful Europeans of the time, there were not some who did not see the possibilities of this strikingly successful example of mass-scale printing, and did not try in their turn to experiment along similar lines.

In Europe, as in China, block printing was followed by printing with movable type. The first major example of such European printing by means of movable type was Gutenberg's *Bible*. This appeared about 1456, only twenty-odd years after the earliest dated block printing of 1423. No certain proof has yet been found linking this mighty achievement with the similar Chinese invention of movable type more than four hundred years earlier, though such a link is not impossible. But in any case it seems evident that printing with movable type in Europe had a connection with the earlier development of block printing, which itself stems back to China. The mere fact that there already existed a process for duplicating books rapidly and inexpensively must have operated, in Europe as in China, as a spur toward devising a still easier method. In Europe the invention of movable type quickly displaced block printing entirely. That this did not happen in China does not mean that the Chinese are more conservative or "backward" than Westerners. It is primarily due to differences between our alphabetic script and the written characters of the Chinese, and not to different ways of thinking between the two races.

Gunpowder

Though little is known about the early history of gunpowder, there is enough to show that it, too, is almost certainly Chinese in origin. As early as the T'ang dynasty (A.D. 618-906) there seem to have existed what were called "fire trees" and "silver flowers." These were apparently fireworks made with something like gunpowder. Later, in the years 1161 and 1162, when the Chinese were suffering invasion from the Chin Tatars to the north, the history of the time states that they successfully used explosives to defeat their attackers. This seems to be definite proof of a knowledge of gunpowder among the Chinese at this period.

There has been considerable argument, however, as to whether these and later references to explosives indicate that the Chinese knew the use of actual cannon as well as of gunpowder. We read in the Chinese records that when the Mongols laid siege to the North China city of Kaifeng in 1232, the people within the city terrified the Mongols by means of a "heaven quaking thunderer". This instrument is described as an iron tube or vessel that was filled with a powder or drug, that is, with gunpowder. Some people think the "thunderer" was a real cannon. In all probability, however, it was really nothing more than some kind of metal bomb which, filled with gunpowder, was hurled by the defenders at the attacking Mongols.

Only a few decades after this time the Mongols completed their conquest of the greatest land empire ever known to man. It included not only all of China, but also most of the rest of Asia and Eastern Europe as far west as Poland and Hungary. Because this empire existed, it was possible for Europeans like Marco Polo to travel freely to the Far East, and for the new things observed there to be brought by them to Europe. It seems highly probable, although not absolutely proved, that gunpowder was among the products which were thus introduced to Europe.

If, however, what has been said above is correct, the use of gunpowder for cannon is an independent development made in Europe. There cannon are referred to in Italy, France, England, and other countries from about 1330 onward. The appearance of cannon later on in China itself may well be an instance of how an invention, originating in one country, is sometimes transferred to another, there improved upon, and then reintroduced into the land of its origin. In any case, the Chinese themselves, despite a familiarity with cannon extending over the past several centuries, have rarely made great use of them until recent times. Their knowledge of gunpowder, for the most part, has been applied to the peaceful art of making fireworks and firecrackers, an art in which they are still supreme.

The Mariner's Compass

The exact history of the compass, like that of gunpowder, is uncertain. The fact that house foundations in the recently excavated capital of the earliest historical Chinese dynasty, the Shang (1766?-1123? B.C.), are laid out according to magnetic north suggests a possible knowledge of magnetism at this early time. The first definite reference to magnetism, however, is found in a Chinese book completed about 240 B.C., which describes the lodestone as a stone that "summons or attracts iron." This statement and certain others in the same book may indicate Greek influence upon Chinese thought, coming through the Asiatic conquests of Alexander the Great. Thus there are hints of a knowledge of the lodestone in the works of somewhat earlier Greek writers.

A clear description of the magnetic compass itself, as distinct from the lodestone, occurs only about 1300 years later. It is found in a Chinese book written by a certain Shen Kua (A.D. 1030-94). His book contains a passage describing geomancers, a kind of fortuneteller long employed in China to determine the luckiness or unluckiness of proposed sites for buildings, graves, and other monuments. Shen Kua writes that such geomancers pursued their art by rubbing a lodestone against a steel needle, thus causing the needle to point south. (South is the primary direction for the Chinese, just as north is for us.) Such a needle, he adds, can then be floated on water, or, best of all, can be suspended from a thread. Shen Kua notes further — and this is remarkable — that the needle never points exactly to true south, but always deviates slightly. The knowledge here shown of the principle of magnetic deviation proves almost certainly that the compass had been long known and studied by the Chinese before Shen Kua's time.

In Shen Kua's description the compass is used only for magical purposes. In a Chinese book probably written shortly before 1125, we find the earliest clear account of the compass as used for actual navigation. The book describes the sea trade between China, the South Seas, India, and Western Asia. Since the Arabs played an important part in this trade, some people have thought that the Arabs rather than the Chinese first applied the invention of the compass to navigation. However, the earlier development of the compass in China itself, and the fact that the earliest references to it in Arabic literature are later than 1125, make it seem unlikely that the Arabs were its first users. What seems most probable is that the Arabs, coming to China in their ships, learned there of the Chinese methods of sailing by compass, and in their turn introduced the compass into Europe.

In Europe the compass is first mentioned in a French poem of 1190, but its application to navigation is mentioned only later. It was not until the fifteenth century that Europeans came to understand the principle of magnetic deviation about which Shen Kua had written some four hundred years earlier.

Plants

Some of the commonest plants grown by us today are of Chinese origin. Among fruits there are the peach and the apricot, which very possibly entered Europe together with the silk trade during Roman times. Many of our citrus fruits, likewise, were originally native to Southeast Asia, including southern China. There they were long known and cultivated by the Chinese before being brought, usually by the Arabs, to the Western world.

The orange, for example, was not known to Europeans until introduced by the Arabs in the eleventh century. In Holland and Germany it is still called the "Chinese apple." The lemon, too, was brought by the Arabs from India to Europe a little before 1400. It had already been cultivated in South China, however, for some time before it spread to India. Another important citrus, our American grapefruit, is a considerably modified descendant of the Chinese pomelo. In this case, however, the fruit did not travel over the southern route by way of India. It was taken in the eighteenth century from China by way of the Pacific and Cape Horn to the West Indies. From there it spread to other parts of the Americas. That is why the grapefruit, even today, is almost unknown in Europe.

Our flower gardens, likewise, are indebted to the Chinese for the chrysanthemum and the tea rose, both of which began to be commonly cultivated in Europe during the eighteenth century. Other flowers which came to Europe at about the same time include the camellia, the azalea, the China aster, and the tall woody-stemmed tree peony.

Among trees, one of the most interesting Chinese contributions is the ginkgo or maidenhair tree, with its curious fan-shaped leaves. This tree is geologically among the most ancient of all living things. It seems to be descended from the giant ferns which once flourished on the earth many millions of years ago, before ordinary trees yet existed. In China and Japan the ginkgo has for centuries been preserved from possible extinction by artificial planting around temples, graveyards, and similar spots. There it often grows to huge dimensions. In recent years it has been introduced into the United States, where it is coming into increasing favor as a shade tree for parks and city streets.

Among other plants and plant products, two have risen to positions of very considerable world importance within the last few decades. One is tung oil, extracted from the nuts of the tung tree, grown in Central China. Tung oil is used in almost all varnishes made today because it dries so rapidly. The other is that wonder plant of modern biochemistry, the soy bean. Grown in North China since time immemorial, it is now being used more and more in this country. It not only makes a flour incredibly rich in food elements of all kinds, but is converted into plastics and a thousand and one other products used in modern industry. Although Manchuria still remains the chief source of the world's supply, the soy bean is being grown in steadily increasing quantities in our Middle West, and may in time become one of America's leading crops.

Other plants in China, though as yet unknown in the West, may some day find an equal welcome. Among them are the deliciously sweet lichee nut, which is really a juicy fruit, though it is known in this country only in its dried form; the curious aquatic vegetable known as the water chestnut; the Chinese persimmon, which grows to almost twice the size of the persimmon native to this country; and the succulent shoots of the young bamboo, which are a favorite article in the Chinese diet.

Minerals

Coal has been known since the fourth century A.D. in China, where in later centuries it came into widespread use. Marco Polo, for example, who visited China during the years 1275 to 1292, writes admiringly how all over the country of Cathay there is a kind of black stones existing in beds in the mountains, which they (the Chinese) dig out and burn like firewood. If you supply them with fire at night, you will find them still alight in the morning; and they make such capital fuel that no other is used throughout the country.

In Europe there was no comparable use of coal until several centuries later, which might seem to point to another case of borrowing from the Far East. The ancient Romans, however, during their occupation of Britain, seem to have known at least something about the rich deposits of coal there. In any case, the modern European use of coal on a large scale, beginning much later than that in China, seems to owe nothing to the Chinese example. It came about as an entirely independent development, which began in England and from there spread to the continent.

A different story lies behind the history of another important mineral, zinc. Chinese coins produced between the years A.D. 1094 and 1098 are described in the Chinese history of the time as containing four parts of copper, two parts of lead, and one part of zinc. Modern analysis of a few of these coins, which shows them to be 55 per cent copper, 26 per cent lead, and 13 per cent zinc, confirms the truth of this statement. Thus, in the eleventh century, the Chinese not only already knew of the existence of zinc, but — and this is more important — they possessed the complex technical knowledge necessary to isolate it in a pure state from other substances and to mix it with other metals according to specified proportions. For several hundred years before the eleventh century, moreover, various terms occur in Chinese literature that probably refer to zinc, though it is not certain that the Chinese at that time could actually produce the pure metal.

Be that as it may, the knowledge and use of zinc in Europe is undoubtedly a great deal later. The first description of it as a separate metal does not occur until the sixteenth century; its production for industrial purposes dates only from the early part of the eighteenth century. At that time an Englishman named Isaac Lawton is said to have gone to China expressly in order to learn the Chinese method of zinc refining. Having acquired this secret, he returned to England not long before 1740. There he began the first industrial production of zinc in Europe. Even then, however, many years were yet to pass before a really large and permanent zinc industry came to be established — that at Silesia, in Germany, about the year 1799.

The third Chinese mineral discussed here is really not a single mineral at all, but an alloy of several metals. It is the alloy commonly, though somewhat incorrectly, known today as "German silver." It is a mixture of copper, nickel, and zinc, and is notable for its silver color, bell-like resonance, and hardness. These qualities make it ideal for use in candlesticks and other decorative articles. In China it has long been known as *pai tongs* which means "white copper." In Europe, consequently, it was at first called paktong, which is about the way *pai t'ung* is pronounced in the Cantonese dialect. The earliest European mention of paktong occurs in the year 1597. From then until the end of the eighteenth century there are references to it as having been exported from Canton to Europe. German imitations of paktong, however, began to appear from about 1750 onward. In 1830 the German process of manufacture was introduced into England, while exports of paktong from China gradually stopped. That is why today the alloy has lost its original name and is generally known to us as German silver.

Medicines

During the last two thousand or more years the Chinese have written a great deal about medicines of all kinds, especially those made from herbs. Between 1552 and 1578 a huge book in fifty-two parts was compiled in China. It describes 1,871 plant, animal, and mineral substances, from which it suggests no less than 8,160 medical prescriptions. Among these, to give but two examples, are chaulmoogra oil (derived from a tree native to Southeast Asia), which is still the only known means for treating leprosy, and ephedrine, a plant drug introduced to the West during the last few decades, and now widely used for treating colds. For many years the Lester Institute in Shanghai has been studying Chinese medical practices. One of the leading drug-making firms in the United States employs a Chinese scientist for the express purpose of studying possible applications of Chinese drugs to modern pharmacy. We may in the future be even more indebted to the Chinese knowledge of medicine than we are today.

Lacquer

Lacquer, like silk, is one of the products longest known in China. It comes from the sap of a tree which is native to China. It is used by the Chinese to paint decorative designs on wooden boxes and other objects, or is applied in layers so thick as to allow itself to be carved into designs. Baskets painted with lacquer have been recovered from Chinese tombs dating from the first century A.D., and it is probable that Chinese lacquer goes back long before this time.

Lacquer was among the flood of Chinese things that entered Europe in the seventeenth and eighteenth centuries, where it enjoyed a popularity surpassed only by that of porcelain. Soon an imitative lacquer industry sprang up in France. There by 1730 lacquered cabinets, chests, and other pieces of furniture were being turned out which could bear comparison with the products of China itself. As in the case of early European porcelain, this lacquer work usually imitated Chinese designs very closely. The newborn industry, however, later declined, leaving China and Japan as the primary suppliers of the world's lacquer-ware today.

Amusements

On the lighter side China has given the West several games and amusements. Probably few bridge or poker enthusiasts, for example, realize, each time they shuffle a pack of cards, the debt they owe to the unknown Chinese who gradually evolved playing cards between thirteen hundred and a thousand years ago. In the case of cards, as in that of so many other Chinese products, the Arabs were probably the intermediaries who introduced them to the Western world. Cards are first mentioned in Spain and in Germany in 1377, and in Italy and France within the next two decades. As has been suggested above, the fact that Chinese playing cards were printed makes it not impossible that they were one of the means through which the knowledge of block printing was carried from China to Europe.

Dominoes is another game which seems to have developed in China about the same time as playing cards. Both dominoes and playing cards were evolved from dice. Dice were known in Western Asia and in India about 3000 B.C., and were introduced into China (where they are first mentioned in A.D. 501) from India.

Still another sport in which the Chinese have long excelled is kite flying. When kite flying was first described in Chinese literature, it was a military exercise rather than a light amusement. We read that in the year A.D. 549, when a certain Chinese city was being besieged, the defenders within the city attempted to send a message to friends on the outside by flying a kite across the encircling enemy lines. The enemy, however, succeeded in shooting it down with bow and arrow. Here is perhaps the world's earliest example of antiaircraft fire! Perhaps the kite fighting of the modern Chinese, in which one kite flier attempts to cut the string or otherwise disable the kite of his opponent, is a survival of this early military use.

In the seventh century kite flying spread to the Near East. It is afterward recorded in Italy in 1589, and reached England a few decades later. Nowhere in these or other countries, however, have the marvelous creations of the Chinese kite builder, made in the form of dragons, birds, insects, and many other creatures, been equaled.

The shadow play is yet another popular Chinese amusement. In this form of entertainment, the producers stand on one side of a white vertical screen of cloth or paper, while the audience sits on the other. Jointed puppet figures made from finely cutout and beautifully colored sheets of parchment are then manipulated against the screen. A bright light from the rear throws their animated shadows through the screen for the enjoyment of the audience on the other side. Such shadow plays have spread from China to many countries, including Java and Turkey. In the eighteenth century they came to France. There they are still known as *ombres chinoises* or "Chinese shadows."

Other Contributions

Goldfish were among the many lighter articles of life that entered Europe from China during the eighteenth century. In China, centuries of intensive breeding have succeeded in producing literally hundreds of exotic varieties, such as are never seen in the Western world. Wallpaper, too, is of Chinese origin. Its importation into Europe in large quantities in the seventeenth and eighteenth centuries led to the establishment of the first important European wallpaper manufactory in France in 1688.

Another everyday object of great utility, for which we are quite possibly indebted to the Chinese, is the folding umbrella. Non-folding parasols or sunshades have been known in many countries since early time, but the complex folding kind seems to have been first produced in China. There, folding metal joints, believed to have been used for large umbrellas mounted on chariots, have been excavated from tombs of the third century B.C. In later times such joints have been made of bamboo. In France and England the umbrella did not become at all well known until about the middle of the seventeenth century, nor do folding umbrellas seem to have been known in Europe before this time. This fact makes it seem plausible, though it is far from definitely proved, that the folding umbrella was one of the many things introduced from China in this and the following century.

The sedan chair or palanquin is still another device long associated with China, where it is mentioned for the first time in the fourth century A.D. Few people think of this as a Chinese "contribution" to the West; yet it is a fact that during much of the seventeenth century it enjoyed wide popularity in Europe. There its lack of wheels made it ideal for comfortable transport over the rough roads of the time. We know, for example, that a certain Duchess of Namur, in Belgium (who died in 1707), used to travel every year by sedan chair a distance of 130 miles to her country home. Forty French "coolies" carried her in relays. By 1737, however, the craze was dying out and the sedan chair came to be replaced by the chaise (a French word also meaning chair). This was a two-wheeled carriage which had been developed in Japan out of the sedan chair, by simply mounting such a chair on wheels and having it drawn by horses. Incidentally, the *jinnrickshaw* or *rickshaw* (a term which in Japanese means "manpower vehicle") is most decidedly not of Chinese or Japanese origin. On the contrary, it represents a Western "contribution" to the Far East. It was invented by an American missionary who lived in Japan during the second half of the nineteenth century. From there it spread to China, and then to other countries as far away as South Africa. In China it is still known as the "foreign vehicle."

Conclusion

How much poorer our Western civilization would be without the things that have just been described! Some, like playing cards, have afforded us untold amusement. Others, like porcelain, give us both efficient service and artistic pleasure. Still others have utterly changed our way of life and are basic to our whole modern civilization. Without paper and printing, for example, we should still be living in the Middle Ages. Without gunpowder, the world might have been spared much suffering, but on the other hand the armored knights of medieval Europe might still reign supreme in their moated castles, and our society might still be held in feudal servitude. Nor would the building of the Panama Canal or of Boulder Dam have been possible! And finally, without the compass, the great age of discovery might never have come, with its quickening of European material and intellectual life, and its bringing to knowledge of worlds hitherto unknown, including our own country.

The story that has been told in this pamphlet deals specifically with China. Yet actually it is only part of a much larger story that goes far beyond the history of any single country. This story is the fascinating one of the growth of human civilization as a whole. Our present ideals and ways of living are not the product of any one race, any single civilization, or any particular portion of the earth's surface. They have developed out of the contributions made by many lands and peoples, including such major civilizations as those of ancient Egypt, Mesopotamia, India, China, and the Arabic countries, as well as our own Western world. Between these various centers of civilization, interchanges in things and ideas have occurred throughout the course of human history, and in many instances extend back even into prehistoric times.

In the past the exchange of goods and ideas between cultures has often been a slow, indirect, and uncertain process. In modern times, on the contrary, the development of rapid communications has enormously increased the possibilities of successful interchange taking place. Yet at the same time these rapid communications have also raised a serious new danger. This is the danger of large-scale conflicts breaking out between peoples and cultures of widely different origin, which were formerly safely separated from one another. In recent years certain countries have attempted to avoid the danger of international war by trying to make themselves wholly self-sufficient. Present-day events, however, have shown that attempts at national isolation not only fail to stop the inevitable interchange of goods and ideas, but actually lead to wars destructive of the nation's welfare.

Only, therefore, by honestly recognizing the growing interdependence of the world as an inescapable fact, can we prepare ourselves to live at peace in a better society of the future. This often requires that we change our attitudes toward other people and customs — attitudes that are inherited and often irrational. Herein lies the hope for a flowering of civilization such as has never yet been seen. It must not be a civilization in which people all over the world eat and dress and think alike, for that would be drab indeed. But it must be one in which each race and people will be given equal opportunity to select the best created by human effort anywhere, and at the same time be left free to develop an individual way of life according to its own particular genius and environment.

Bibliography

The information contained in this pamphlet has been collected from a large number of books and periodical articles. The following, however, are a few selected books which treat the history of Chinese-Western contacts in a broad and readable way:

• Carter, Thomas Francis. *The Invention of Printing in China and Its Spread Westward*. New York: Columbia University Press, 1925 (second edition, 1931).

A fascinating book which deals not only with printing and paper, but also touches on games, gunpowder, the compass, and many other subjects.

• Hudson, G. F. *Europe and China: A survey of their relations from the earliest times to 1800*. London: Edward Arnold and Co., 1931.

This is the most comprehensive single account.

• Reichwein, Adolf. *China and Europe: Intellectual and artistic contacts in the eighteenth century* (translated from the German by J. C. Powell). New York: A. A. Knopf, 1925.

Though this restricts itself to a single brief period, it is a period that is of great interest in the history of Sino-European cultural relations.

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Derk Bodde, *Assistant Professor of Chinese, University of Pennsylvania*
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The American Council on Education
George F. Zook, *President*

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