

China: the ancient civilization



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There is no modern without an ancient just as there is no present without a past. Everything we have today we owe to the bright minds of our ancestors, and their ancestors. Almost every gadget,[1]tool, and device we have today is the result of a person's effort to make life a little easier, a person's desire to explore something new, and a person's effort to understand the world around them.

Of the ancient civilizations, it seems that the Chinese were the most curious, and most driven to enhance the quality of life. They had the most prominent and strongly impacting inventions not just during their time, but for all time. The Chinese inventions have three clear divisions. These are: recreational, medicinal and technological, and military.

The people of ancient China made many significant advancements in the fields of both science and medicine, which only continues to show how sophisticated and modernized their way of thinking was back then. A lot of the medical treatments still being practiced by doctors today stem from ancient Chinese practices; records of such have been found as early as the Zhou Dynasty (1050-256 BCE). In Confucius' The Book of Rites, there is a record that speaks about court physicians and their division of medical teaching into internal medicine, surgery, nutrition and veterinary practice, evidence that medicine was already very much developed during those times. Ancient China had contributed to many branches of medicine including of pharmacology, endocrinology, clinical medicine, public health, acupuncture, and medical education.

The very beginning of Chinese medicine is attributed to Shennong, the legendary emperor, who had personally tasted hundreds of plants in order to discover which ones had medicinal values. He was also said to have introduced the technique of acupuncture. During the Han Dynasty, doctors were already using methods such as pulse-reading to examine patients for the purpose of diagnosis. Around 2nd century BCE, the Chinese discovered the anti-malarial properties of a plant called Artemisia (or Qing Hao), which they also used to cure skin diseases (apart from malaria). (1) It is the active substance called artemisinin or qinghaosu contained in the plant that enables it to fight the disease of malaria. It is so effective that even until today, this method of treatment continues to be used. Around 10th century CE, the inoculation or vaccination of smallpox was discovered in the southern province of Szechuan. It is said that Taoist alchemists, who lived as hermits in the mountain of O-Mei Shan, practiced this technique of inoculation, which later caught the attention of the public when the eldest son of Prime Minister Wang Tan died of smallpox. Records of what may be diabetes have also been found in ancient Chinese texts. In the text Huang Di Nei Jing, a syndrome named xiao ke was described in detail. This syndrome was said to arise from eating too much fatty and sweet foods, a description that is very similar to type 2 or insulin-independent diabetes (the most common form of diabetes today). The Chinese produced even minor treatments like eye drops, made from a plant called the Mahuang and promoted the importance of proper diets as a way to cure deficiency diseases. They made use of wine and hot water as medicine, and bronze knives and needles as surgical instruments.

China has contributed quite a lot to the field of science and technology as well. Amazingly, many of these major scientific inventions, which are still in use today, began during the ancient times. Some of these discoveries were even accidental, which is the case for one of the most significant Chinese inventions in history: gunpowder. During the Han Dynasty, alchemists did extensive research and conducted many experiments in search for the elixir of immortality. In their search, they made use of substances like sulfur and saltpeter, which led them to discover many chemical properties along the way. It was during the Tang Dynasty that they discovered that sulfur and saltpeter, when combined with charcoal, caused an explosive effect, which is known today as huoyao or gunpowder. Gunpowder is considered to be one of the four great inventions of China; the other three are the compass, paper and printing technique. The compass was invented during the Qin Dynasty and was used by travelers to find their way back home after traveling to far lands in search for jade and other great treasures. The compass was called zhi nan zhen, which meant needle pointing south. The first person to use this tool was Zheng He of the Yunnan Province, who was ordered by the Emperor to make ocean voyages. Another invention, which was also used for determining direction, was invented by Huangdi and was called the zhi nan che or vehicle pointing south.

Before paper came into existence, the Chinese would use bamboo slips, bones and tortoise shells to write on. Because these materials were bulky and heavy, many were discouraged from writing down their thoughts and daily experiences up until 105 CE, when the invention of paper was first reported. The name most attributed to this great invention is Ts'ai Lun,

though it is not certain if he was the real inventor or just the court official that presented the invention to the emperor. Ts'ai Lun supposedly took inner bark of a mulberry tree along with bamboo fibers, and mixed them with water. He then pounded this mixture with a wooden tool, poured it into a piece of woven cloth and let the water drain through. The fibers that were left behind on the cloth formed the paper material. The printing technique, which made use of carved wooden blocks, first appeared in early Tang Dynasty but only became widely used during the Song Dynasty. This new invention encouraged central and local governments to publish more books. It was Bi Sheng who invented movable type printing during the Song Dynasty.

The first machines invented in China include the potter's wheel, deep drilling devices, efficient animals harnesses, the stirrup, escapements, wheelbarrows and the first computer. In 1st century CE, the Chinese invented the chain pump, which they still use until today. Around 132 CE, Zhang Heng invented the first ever seismograph, which was called the dragon jar. This device would simply register the occurrence of an earthquake using the eight dragonheads arranged around its brim. China is also the pioneer of wind direction devices including weather vanes. As early as 1st century BCE, the Chinese had records of "wind seasons." Methods like forensic entomology and fingerprinting were already used in 700 CE as a way of solving murders and identifying people. Thumbprints were found on clay seals and on various official documents.

The ancient Chinese people already had coal as an energy source as early as the Han Dynasty in hand with a coal mining industry. Coal was unearthed in

Shan Hai Jing and Fushun in Northeast China. Along with coal unearthed in residential areas, the Shui Jing Zhu or notes on waterways classic had a narration of one of the coalmines in Ancient China, the Bingjingtai. Coal mining made good progress during the Song Dynasty wherein the government set up a special institution to facilitate coal mining and monopolize it.

Now, a reasonable chunk of Chinese inventions were geared towards a particular aspect of life, making it easier and more enjoyable especially with the Chinese being biased towards the liberal arts as opposed to science because of the lack of conscious interest the people had towards science. A lot of inventions were pointed towards recreational use as well as making everyday functions easier or at least open the way to innovation. These inventions also wound up being adapted by many Western cultures and are still used or can be connected to their Chinese roots. These inventions which we see in our culture in our daily lives often have unknown roots to as where they were invented. They could be as important as the paper money system and toilet paper, or still as essential but on a lesser scale as restaurant menus and eyedrops.

One of the greatest inventions of Ancient China is something we use in our everyday lives, paper. Although paper was initially used for wrapping and padding, the use of paper as a writing medium began in the 3rd century. Paper had many new ways of being used which was due to the Chinese' knack for innovation. 6th century China began using it as toilet paper, something we can't live without in our present day. Paper was also used to make tea bags during the Tang dynasty, an age of culture in Chinese history.

These tea bags are now a popular worldwide drink. Paper was considered one of the greatest inventions of Ancient China because of the position it had with exchanges between the East and the West. Paper is now seen in every society, culture, and part of the world as an essential medium for anything written or printed.

A very important system we use today is the type of currency we use, paper money. Paper money or banknotes first appeared in China because the coins used for currency were sometimes too heavy to carry around especially for the rich folk. To address this problem, the coins were left to a trusted person in return for a piece of paper (Some kind of modern I. O. U) and the paper money was called jiaozi. Paper money or banknotes during ancient Chinese times often had a duration which discounted its' value after some time until the reign of Kublai Khan during the Yuan dynasty in which he removed the durations and called the banknotes Chao.

Another great invention of the Ancient Chinese are often seen in homes and in our daily lives, the use of pottery, porcelain and silk. Chinese pottery dates as far back as 8000 years ago and as compared to all historical periods, Chinese pottery was the one that kept improving and surpassing the quality of other civilizations with pottery (2). The production of pottery and porcelain was a whole culture in itself representing the Chinese' economy, culture, science and technology. Though pottery started simple with simple shapes and rough features, the Chinese were able to mold it into something complex and beautiful for their culture. Among the most well-known works of pottery of Ancient China are the famous terracotta warriors and horses found in the tombs in Lintong of Shaanxi Province, the tomb of emperor Shihuang of the

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Qin dynasty. The tomb holding the terracotta army had thousands of clay soldiers and horses which had lifelike features and shows the skill of the ceramic artisans at that time. This marvelous display of the use of clay also represented the Chinese high value of life, believing that things in the tomb of people would accompany them in their second life, the afterlife. Though this belief started with the actual killing of servants, warriors and horses, the Chinese were able to see the value of life and instead use figurines as a substitute. Pottery advanced in many time periods during the Ancient Chinese era, from the ceramics during the Tang Dynasty which had three main colors, yellow, green and white up until the Zisha Tao or purple-clay pottery. China is also known as the capital of porcelain, a white, rigid and water-resistant piece of pottery. The use of porcelain boomed during the Song Dynasty with the discovery of a wide variety of designs. Porcelain from the Yuan dynasty was also widely regarded as top quality. Ming and Qing dynasties also had its' own admirers as seen in this description, " as thin as paper, as bright as mirror, as white as snow, and as resonant as chime stone" (2). Silk was also a big part of Chinese culture that was discovered from silkworms eating on their mulberry trees. Silk was unearthed as far back as 4700 years ago in the Zhejiang Province in Eastern China. The use of silk was already popular during the Shang dynasty. Chinese people even included how to prevent silkworm diseases in the Li Ji or the Book of Rites. Silk was used to increase the dignity of the noble people as well as to add to the allure of their women. It also became a major export even opening the Silk Road. Silk and ceramics show the Chinese rich economy and culture because of how they were able to develop these arts as well as trade them to the world. (3)

Tea and Wine are two beverages whose roots our society knows little about yet consume on a great scale. The ancient Chinese were the first people to process tea and make it into a beverage. Tea was said to have been discovered by Shennong, a legendary god who was cured by tea leaves from a coma. Tea was valued in ancient China even being offered to ranking officials as tributes and becoming an essential part of their everyday lives. People of the Tang dynasty had a saying that " people can do without food[2]for several days but not a single day without tea". Tea was another valuable export of the Chinese people (4). The Chinese were also the first to discover wine. Yi Di was said to be the first to make wine and making wine probably started in the Yangshao period, about 4000 to 5000 years ago. The Chinese came up with many different methods of creating yeast for their wines, a sign of their innovation and creativity. A big achievement in Chinese history regarding wine was during the Song Dynasty, when hongqu or red yeast was used (5). Wine is a beverage that was adopted by the West and have been made in their own ways like the in the vineyards of Italy and other countries. A very important spice was also given its first use by the Chinese, salt. It was as early as 2700 B. C. E. that salt was already used for pickling in China, salt trade also helped finance the Great Wall.

The Chinese also made important contributions to Astronomy. Emperor Huangdi often observed the stars to make out a calendar as well as naming metal, wood, fire, water and earth as the five elements. He even understood the concept of leap months and days in the calendar. A lot of astronomers in China were able to observe the stars and was compiled by the astronomer Chen Zhou. With this map, people were able to make the star atlas and

catalogue with coordinates for each star. The advanced techniques used by the Chinese astronomers during the Warring States Period prove that they led the world in astronomy and astronomical tools (6).

There were also many minor inventions the Chinese had which was adopted by the west and used by society in the present day. They invented the kite initially for war but became a tool for entertainment in the mid Tang Dynasty. Its popularity goes as far as the emperor Huizong actually presiding over a compilation about kites called “ A Collection of Kites from the Xuanhe Years” (7). And their attempt to fit a man inside a kite led to the popular extreme sport we know today as Hang-gliding. Similar to the kite’s initial purpose, the hot-air balloon also became popular for entertainment during the Yuan dynasty wherein it attracted a lot of popular viewers. The original creator of the hot-air balloon was a war tactician named Zhuge Liang (8). Board games such as Mahjong also became popular because of the Chinese’ inventions, the Domino in particular (Dominoes). They were apparently derived from the cubic dice, which had been popular in Ancient China. The Chinese even helped give us some popular sports the world acknowledges today, specifically Archery, Golf and even Football. Archery goes back all the way to the Paleolithic age in Shanxi Province wherein archeologists unearthed finely made arrowheads. China was also the birthplace of the world’s number one sport, Football otherwise known as Soccer. Football was initially called cu ju which translates to kick ball in Ancient China. Inscriptions on bones and turtle shells during the Shang Dynasty proves that the sport was born in China. The ball was initially made of leather and hair while the first inflated ball was made during the late Tang Dynasty with the use of

animal bladders. The game was said to have spread to the West because of wars with foreign countries(9). Chui wan or strike pellet is said to be the origin of the game Tiger Woods dominates, Golf. Other minor inventions were the principle of camera obscura, an early way of projecting images. Mo-Ti, the inventor referred to his camera as “ locked treasure room”.

The Chinese made many inventions towards recreational use and enjoying life because of their bias towards the liberal arts. Although they still made great contributions to science, their contributions to culture, the classics, sports, and other activities are common in our world today. It is important that one knows the foundation of these activities and objects one enjoys today so that proper credit may be given to the innovators.

Now, creating a civilization like that of the Chinese does not come without consequences and at no cost. They did have to fight many battles both to unify themselves, and defend themselves from would be conquerors. In order to do this, they couldn't fall behind in terms of military might. To make sure that they always had the upper hand, the Chinese invented many simple, yet effective tools of war. The Military inventions of ancient China were the kite, the wheelbarrow, naval mines, land mines, the flamethrower, the early form of mustard gas, the fire lance, paper armor, and the crossbow.

The wheelbarrow is speculated to have already been invented by at least the first century BCE. They were primarily used for war in that they were an efficient way to carry around large quantities of supplies, or heavy supplies such as armor, weapons, and ammunition. They were chosen over the larger vehicles because first, they could be operated by a person which was

favorable over oxen in battle, and second, because they were more maneuverable around difficult terrain. They had many variations depending on the situation. Some wheelbarrows used single central wheels while others used two wheels. One famous variation of the[3]wheelbarrow was the add-on of a sail. This innovation allowed the wheelbarrows to travel up to 40 miles per hour. (10)

Another invention that seems completely unrelated to war is the kite. The Mozi mentioned kites in 400 BCE. Kites were described as “ a bird constructed from bamboo and wood.” (10) The materials used to produce kites were primarily silk and bamboo. Silk was the most lightweight and most durable material at the disposal of the Chinese, while bamboo was the lightest, and one of the most durable types of wood available. It is speculated that kites were used to signal the soldiers in armies during and outside of battle with instructions. For instance, different colored kites carried different orders for armies.

As if the Chinese hadn't already proven that anything could be used in war, they began using paper for armor. Yes, that's right. The Chinese used paper for armor. The paper armor was highly praised for its warmth, comfort, and durability. In fact, in 1625, Mao Yuanyi, a Yellow Turban Rebel during the Han Dynasty, wrote: “ the best choice for foot soldiers is paper armor, mixed with a variety of silk and cloth.” (11)

The new weapons invented by the Chinese during these times were the Fire Lance, the Crossbow, the Flamethrower, Naval Mines, Land Mines, and the precursor to mustard gas. Naval mines were made by putting gunpowder in

a barrel sealed with putty. They were either timed or made to explode by a hidden ambusher that would pull a cord and activate a Wheelock to create a spark and set off the explosion when an enemy ship sailed too close.

Landmines functioned in pretty much the same way. Hidden ambushers would wait for enemies before lighting hidden fuses to set off the landmines. They did however, have an automatic way of activation. These automated land mines used weight drives. When a person steps on the landmine, the weights drop, activate a flame, and set off the landmine.

The fire lance was the precursor to the gun. It was a bamboo tube that was filled with either a projectile or poison dart. These tubes were tied on to spears and then ignited to set off the gunpowder and launch the projectile.

(11) The crossbow functions much like the crossbows of today. They had a string that was latched onto the tip of a trigger. When the trigger is pulled, the crossbow bolt flies. The Chinese flamethrower used double-action bellows placed beneath a hot cauldron with a mixture much like Greek-fire to spew fire. (11) It was the first type of flamethrower that could continuously shoot fire. The precursor to mustard gas was a simple mixture of around fifteen pounds of feces, herbs, and poison. When lobbed into a battle, it irritated and blistered skin. It was highly favored since it penetrated armor.

(11)

4All of these weapons, with the exception of the flamethrower, show which side the Chinese were commonly on in battle. First of all, projectile weapons such as the Fire Lance and Crossbow are dangerous to use in skirmishes, and when the people shooting them do not have the high ground because of the chances of friendly fire. Based on that knowledge, these weapons were most

probably used from castle walls, hills, and early in battle, before the skirmishes begin. Naval mines, land mines, and the early mustard gas were of course used as traps. But when and where are traps set? They are often set to fend off an invasion in one's home territory. This tells us that these were primarily defensive weapons. They were most effective in battles where the Chinese were able to choose where the battles would take place. What does all of this tell us? It tells us that the Chinese defended their land more than conquered. They held off invasions, rebellions, and raids more than attack foreigners.

The Chinese opened the door for the golden ages of technology. Their inventions paved the way for great thinkers and great nations alike to create things never heard of before and to conceive new ways of doing things.

It's obvious that not all the world's innovations came from China, but it is safe to say that many of them were either adapted from ancient Chinese inventions or simply continuations of the inventions themselves. Things like the compass, for example, are Western adaptations of Chinese south pointing chariots. China, with all its riches, land, and manpower, was the perfect place for innovation to flourish.

But why did the Chinese invent? It is natural for a person to explore and experiment with his environment, but what the Chinese did was not merely exploration and random wonderment. They wondered with a goal, and they explored with direction.[5]

It can be said that, based on their early inventions, they created because they valued the gift of life highly. They sought not only to exist, but also to

live. To merely go throughout life breaking one's back for daily meals did not appeal to them. They created tools such as the wheelbarrow and trip hammer that would help alleviate the workload of everyday life. They created games such as Cu Ju and Chui Wan that would allow one to enjoy life. They created practices and medicine to sustain life. They created things such as the early seismograph and star maps to understand life and the world around them. They also created weapons, but not with the primary purpose of destroying life, but with the purpose of protecting life and protecting order.

However, compared to the Western Civilizations, China churned out massive amounts of innovations. What did China have that allowed it to invent so much so quickly compared to the Western Civilizations? Well, the first factor would be China's immense resources. They had the means to support research and development within their population and the means to mass-produce the new inventions. The second factor was that they generally lived in times of peace. While they did have many periods of war, the periods of peace, or at least relative peace allowed the Chinese to focus on improving their society. The third factor is exactly the opposite of the second. War forced them to create new weapons. There is an old saying, "In peace culture prospers, in war science flourishes." The fourth factor would be the trade routes. China was exposed to many different cultures. Technology was oftentimes the most valuable commodity traded. While the Chinese inventions were oftentimes not direct descendants or copies of foreign technology, they were most likely influenced by them.

There is one factor that does seem to stand out above the rest, and this is need. The Chinese had many needs. They needed to meet the demands for food by a growing population, they needed to understand human ailments to be able to treat people, they needed to find more efficient ways of transporting supplies and more efficient ways of navigating rivers. Need is probably the single greatest driving force that the Chinese had. Like it was said in the movie *Robots*, “ See a need, fill a need.”

Although the Chinese did have a general sense of direction with their inventing, there was also the factor of luck. In the creation of gunpowder, for instance, it was by chance that they realized a mix of saltpeter, sulfur, and coal produced an explosive effect. Like Doctor Marquez says, “ Innovation happens when readiness meets serendipity.”

Our present world cannot be divided into a West and an East but as a joint creation of East and West, of China and other countries. China’s society has had its’ ups and downs during its different dynasties. A strong foundation was built during the Spring, Autumn and Warring States periods which laid down a foundation for the development of science and technology. The Han and Tang dynasties wherein nations were unified, the Wei and Jin dynasties wherein the country was divided or the Song and Ming dynasties which enjoyed prosperity. All these different dynasties and up and downs in Ancient Chinese history, even the Yuan and Qing dynasty, which had leaders coming from ethnic minorities. All these times contribute to the Chinese success with innovation as compared to the West. And although the Chinese were responsible for a lot of “ firsts”, the West can still be given credit for further advancing these firsts in their own ways.

The fact that the Chinese lead the world in technology does not necessarily mean that they were the brightest or best. A lot of factors came into play that allowed the Chinese to invent so many things and advance in technology. In the end, it all comes down to the right circumstances. What probably put the Chinese in the perfect situation is again, serendipity.

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