

## **Chinese Technology (Techniques, Methods, Equipment) - Ancient Period**

**Introduction** Chinese society created a stable, high-functioning and integrated economy in the bronze and iron ages. As was true of all early societies, its foundation was a thriving and well-managed agricultural sector. Farming sustained massive populations, provided a reliable basis for taxation and enjoyed domestic micro-economic trading zones. It produced excess in most years, which allowed for large segments of society to specialize in sectors other than farming. Chinese growers were extremely capable and worked in concert with the government to build and manage infrastructure projects that all used to their advantage and in which all took great pride. Even though ancient and post-classical Chinese dynasties occupied a geographic space that encompassed half the territory of contemporary China, the sheer size and scope of the world's largest population worked as an advantage most of the time. When unified and well-led, the Chinese economy was a powerhouse and dwarfed all nations around it. When economic fortunes reversed, however, that same population suffered on a similarly grand scale. For most of Chinese history, other East Asian peoples watched the Chinese economy carefully and traded on terms that emperors dictated. At the beginning of the 19<sup>th</sup> century, however, conditions changed worldwide and China entered a 150 year period of economic contraction and humiliation. It had missed the industrial revolution. For much of that time, hunger was a specter haunting large segments of the population. In the past four decades, the Chinese economy has expanded dramatically. Hunger has been vanquished and China has reclaimed its place among the economic giants of the world. Though not wealthy on a per-capita basis, China's emerging middle class alone (approximately 400 million people) dwarfs the entire population of every other nation except India. The future looks bright.

### **PREHISTORY—The Neolithic age (10,000 BCE-2000 BCE)**

**Hunting and Gathering** Neolithic era Chinese did not engage in agriculture early in the period. They gathered berries, roots, nuts, and other readily available foodstuffs based on the season. Chestnuts, in particular, have been found in archaeological digs. These and other such items could be stored to help them get through a winter that was longer and colder (as the last glaciers melted) for most of the period than is the case today. In addition to foodstuffs that could be gathered, hunting provided the protein needed to sustain most of the population. Early in the period, large game such as bear, deer, and wild boar were regular food items for inland people groups. For groups near to the coast and to fresh water sources, fishing was the primary source of protein. Later in the period, smaller game such as squirrels, rabbits, and birds of all varieties were trapped and/or hunted.

**Agriculture and Rice.** In the middle and late neolithic periods, Chinese society began the most important transformation in its history: the adoption of agriculture and animal husbandry. It is hard to overstate the importance of wet rice cultivation because it revolutionized the early culture of the lower Yangzi River valley and then went on to become the single most important staple for the majority of humanity. There is no universal consensus among scholars on the genesis of rice cultivation. Some scholars argue for southeast Asia, some argue for south Asia and still others the Yangzi River valley. Indeed, it has become a point of national pride to find evidence of the first cultivation. Regardless, in a 5000 year period between the 10<sup>th</sup> and 5<sup>th</sup> millennium BCE, rice shifted from growing wild in the Yangzi River valley to being cultivated by humans. This event had monumental effects for human settlements. Instead of moving from time to time when seasons changed or when resources dwindled, neolithic Chinese shifted to live long-term in settlements and villages, some of which grew quite large. Society was ordered around the cultivation, storage, distribution and protection of this most important foodstuff. When successfully implemented, rice cultivation provided a stable, reliable source of excess calories, which in turn allowed for population increases. A larger population required more social structure, the careful control of resources and the development of local government. Human dwellings had to be fairly close to rice paddies, water and irrigation infrastructure, but higher and far enough away from water to avoid the danger of occasional flooding. Village dwellings were also grouped around rice storage buildings so that they could be controlled and protected and food easily distributed. Villagers had to learn how to get along with those who were not necessarily members of the same family or clan.

**Millet.** For northern China, millet became one of the most important early important crops. It grew wild in north China in the early neolithic period and was among the first grains to be domesticated. Residue found in archaeological digs indicate that it existed as early as 6500 BCE in the Yangshao culture (located at the intersection of the Wei River Valley at the bend of the Yellow River).

**Animals.** Animal husbandry also emerged during the late neolithic period. Humans domesticated wild boar, giving us the pigs we know today. Wild chickens, though likely not native to China, were domesticated and appear in the archaeological record in China as early as 5400 BCE. Cows, horses and oxen provided milk, cheese, protein, labor and transportation. Dogs sounded the alarm when enemies approached and fought off predators near settlements.

**Technology.** In order to cultivate rice, paddies had to be created. Paddies had to be flooded during the transplantation stage of development for a period of several weeks. This required the landscape to be transformed as well because paddies must be relatively flat and ringed by small dykes, a condition that does not exist in a state of nature. Shovels, hoes and other earth moving tools were necessary to prepare the land. Canals, ditches and other irrigation infrastructure had to be tied in to rivers and creeks. Finally, sluice gates and a drainage mechanism had to be in place in order to remove water from the paddies at the appropriate time. Millstones helped grind hard to digest whole grain millet and other grains. In short, wet rice agriculture created the conditions which placed a premium on the development of tools, weapons and other implements that facilitated farming, storage and fighting. Those cultures that produced artisans who could cast bronze, and later iron, were able to out compete their neighbors. The slow abandonment of stone and wooden implements and the adoption of metal tools brought humanity new models for society and civilization.

### **BRONZE AGE (2000 BCE-600 BCE)**

**Agriculture.** The economy of Bronze Age China was largely agrarian. Many peasants were serfs or subsistence farmers and barely grew enough food to pay their taxes and survive from season to season. Unlike some of the other Bronze Age cultures, bronze implements were slow to be introduced into the daily life of peasants (and equally slow to be used for military purposes). The reason for this is unknown. Nonetheless, some bronze tools have been unearthed in archaeological sites. This indicates that though peasants were able to scratch a living out of the earth, their ability to produce food in excess was likely limited.

**Diet.** In contrast to conventional wisdom, the Chinese diet in the early and middle Bronze Age was not based only on rice. Instead, crops more suited to cultivation on the north China plain were grown including millet, early varieties of wheat, hemp, barely and the like. There is also evidence of the consumption of livestock such as pork and beef. In the southern areas of China where moisture is much more abundant, wet rice agriculture was in use as early as the 4500 BCE. However, it was not introduced into northern China until the late Shang period. Wet rice agriculture is very labor intensive, but good producers were able to grow more than was necessary for consumption by one family. Calories were therefore beginning to be produced in excess in the late Bronze Age, allowing for additional members of society to specialize in pursuits other than agriculture and for a rise in population. As a result, cities grew dramatically larger and more important. Vestiges of pre-wet rice agriculture can be seen in the regional cuisine of contemporary China. For example, the cuisine of north China still shows evidence of more reliance on grains other than rice.

### **IRON AGE (1000 BCE-500 CE)**

**Technology.** The economy of Iron Age China was largely agrarian. That is not to say that there were not advances in technology which made the lives of working peasants, artisans and laborers much more productive than their ancestors. Indeed, the Chinese economy benefited immensely from the shift from Bronze Age technology to Iron Age technology. Iron implements made possible the expansion of agriculture into marginal lands which had previously not been under cultivation. It was possible in the late Warring Kingdoms period (475 BCE-221 BCE) for your average peasant to possess iron hoes, scythes, plows, axes and more, all of which were utilized in agriculture. Iron was also used in carts used to transport goods and in yokes to harness oxen both on the roads and in the fields. In addition, iron was used for shovels to dig irrigation ditches, in dredging equipment and the like. Finally, iron cooking utensils became widespread during the Iron Age. Because of advances in agriculture, populations increased dramatically. There were also more people shifting from subsistence farming to other endeavors where they were allowed to specialize in skilled professions and become masons, smithies, farriers, carpenters, coopers, and the like. Others became educators, philosophers, clergy, accountants, bookkeepers and bureaucrats. Still others were dedicated to the art of war and became fletchers, swordsmiths, bowmen, professional soldiers, foundrymen, etc. Many of these professions had existed in the Bronze Age, but in much smaller numbers. Their proliferation in the Iron Age made possible the classical age of human history.