Kyle Cederberg

11/25/13

HI 3335 B01

History of Science, Technology, and Medicine in China

The History of science, technology, and medicine is often related back to the Scientific Revolution in Europe but most of the world’s modern science can be traced back to China’s advancements which were centuries ahead of Europe. The Chinese played a key role in the course of the history of science, technology, and medicine. China created most of the world’s basic scientific principles that later progressed into the modern science used today. One of China’s greatest advancements in history was their improvements in farming methods and technology. These new inventions and methods made Chinese farming easier, faster, and increased farming production. These improvements have changed the history of how farming is done around the world.

Beginning in about 7500 BC with classical millet agriculture, China's development of farming over the course of its history has played a key role in supporting the growth of what is now the largest population in the world. Due to China's status as a developing country and its severe shortage of arable land, farming in China has always been very labor-intensive. Also finding flat land to grow crops was very difficult due to the fact that the region of China is mountainous. With a population that was growing exponentially, food and a reliable farming system became a high priority. China focused more on inventing things that they needed instead of just inventing things like the Europeans

Even though China didn’t have a scientific revolution they still produced a high amount of inventions and scientific achievements. Throughout China’s history, various methods have been developed that enabled greater farming production and efficiency. Inventions and improvements like the square-pallet [chain pump](https://exchange.wpi.edu/owa/redir.aspx?C=87e9075c780f4e01bbfb4537a56d02bd&URL=http%3a%2f%2fen.wikipedia.org%2fwiki%2fChain_pump) and water controls, hydraulic-powered [trip hammer](https://exchange.wpi.edu/owa/redir.aspx?C=87e9075c780f4e01bbfb4537a56d02bd&URL=http%3a%2f%2fen.wikipedia.org%2fwiki%2fTrip_hammer), improvements in feedlots[[1]](#footnote-1), row crop farming, iron and steel tools, boats for fishing, the speed drill, and rice terrace.[[2]](#footnote-2) All of these inventions started the rise of one the major powers in the world today and these inventions were soon adopted by other nations around the world to improve their farming.

Around 1000 AD, China had a sudden shift in farming methods by moving away from dry wheat farming and switching over to wet rice farming.[[3]](#footnote-3) China originally had the majority of its farming population in northern China. In northern China farming mostly consisted of dry fields of wheat. Since this method was not very productive people decided to migrate to southern China closer to the wet lands to do their grain farming. This was the start of the Chinese rice farming in wet fields. One historian believes that this is what delayed China from having a scientific revolution.[[4]](#footnote-4) Christopher Cullen says that rice farming was more about animal power and water control where the European way of farming relied more of machinery and technology. “Medieval China is sort of less mechanical place then medieval Europe.”[[5]](#footnote-5) Even though Chinese advancement was not leading towards a revolution they were leading to a change in the history of science and the process of farming.

With the beginning of wet fields it became a high priority for there to be proper irrigation around China. Most of the area in China was not suitable for farming so changes had to be made in order to farm. Rice was farmed in terraces which were carved into mountains like giant green stairs. It was believed that “…irrigation is…” impossible “…in hilly or mountainous areas.”[[6]](#footnote-6) In order to keep these areas well irrigated the Chinese invented pumps. The square-pallet chain pump is one of the earliest known water pumps in the world. It was used largely to lift water from a lower to higher elevation in filling irrigation canals and channels for farmland. These sort of advancements could not be found anywhere around the world during this time. This was the start of hydraulic engineering which gave China the ability “…to control waterways and to develop river conservation, defense against floods and droughts, irrigation for agriculture…”[[7]](#footnote-7) With the ability to control water, wet farming became a much easier task but there were other Chinese inventions that helped with the production of crops.

Starting around the first century BC during the ancient Han Dynasty, China had invented the powered trip hammer whose main function was to pound, decorticate, and polish grain that otherwise would have been done manually. This was the first of its kind and changed the production of grain around China. The use of water powered mills and animal powered machines made farms more productive. With Chinas ability to control water, they could channel that energy to mills in order to power machinery like the powered trip hammer. Animals were used to pull the moldboard plough which was a device used to help churn up the soil. Methods like this had been used before but they resulted in choking the animals and this new plough prevented that. China also utilized the animals as a use of fertilizer. With the production of food becoming quicker rice could now be grown twice a year.

Another invention was the speed drill which eliminated hand planting the seeds. The speed drill also helped improve row farming. Row farming was a method of farming where crops are laid out in rows in order to get the most crops planted in the space you had. This method is so effective that it can still be found being used today all around the globe. China was also the first to create cast iron which was used to make iron tools that where more durable and better to work with. China had “…the mastery of iron casting occurring some fifteen centuries before its achievement in Europe,”[[8]](#footnote-8) All these inventions where created centuries before Europe had them.

Looking at the list of Chinese advancements before the rest of the world it’s a wonder as to why the scientific revolution did not occur in China. It’s hard “…to produce a nice factor that says sort of why…” the Chinese scientific revolution didn’t occur because “…we are not sure the point is proved.”[[9]](#footnote-9) Europe had a scientific revolution because it was the age of mass inventions and discoveries. Europe turned these new studies into a profession which drew people towards these studies. Europe soon had numerous amounts of inventers and thinkers which led to the jump in advancements. China on the other hand had a much slower process in comparison to Europe. It is hard to consider all these advancements a revolution when they occurred over a span of hundreds of years. China was more interested in making advancements in areas that were necessary for their survival such as agriculture. With such a large population, China needed to improve their methods of farming in order to feed the population. Christopher Cullen put it best with his statement, “Once one part of the world has a scientific revolution in one part of the world it obliterates any possibilities of it happening anywhere else.”[[10]](#footnote-10) Since China never really had a revolution before Europe there was no need for one afterwards. With Europe’s age of exploration, soon most of the world was adopting their ideas. Europe believed that because they had a scientific revolution they were the most advanced nations. They went around the world and spread their ideas, which is why the history of science always seems to relate back to Europe instead of China.

China may have not had a scientific revolution but they did change the course of history in science, technology, and medicine. Their advancements in these fields were centuries ahead of anywhere else in the world. For a country that originally did not even have a word for science or scientist, their advancements in the fields had major impacts of the course of history of science. Today, Chinese agriculture sustains 22 percent of the world's population, with less than 8 percent of the world's arable land. Due to Chinas advancements in farming they are now ranked first worldwide in farm output. This makes farming a huge part of Chinese economy with over 300 million employed in the field.[[11]](#footnote-11) Due to the science and technology they discovered, they have turned into the largest agricultural country in the world.

# Bibliography

Macfarlane, Alan, and Christopher Cullen. 2004. Chinese agriculture. UK:

Butterfield, Kenyon Leech, 1868-1935. Education and chinese agriculture China Christian Educational Assoc.

Schmalzer, Sigrid. 2002. Breeding a better china: Pigs, practices, and place in a chinese county, 1929–1937. Geographical Review 92 (1): 1-22.

Wiens, Thomas B. 1978. Chinese agriculture: Continued self-reliance. American Journal of Agricultural Economics 60 (5): 872-7.

Needham, Joseph. Science in Traditional China: A Comparative Perspective. Cambridge, MA: Harvard UP, 1981. Print.

Lardy, Nicholas. 1980. Chinese agriculture: Development, production, and trade: Discussion. American Journal of Agricultural Economics 62 (2): 356-8.

Li Genpan. 2009. Thought and practice of sustainable development in chinese traditional agriculture. China Agricultural Economic Review 1 (1): 97-109.

Frater, Jamie. "10 Great Ancient Chinese Inventions." Listverse. N.p., 18 Apr. 2009. Web. 24 Nov. 2013.

Neterval, Margaret. "History of Agriculture in China." *History of Agriculture in China*. N.p., n.d. Web. 01 Dec. 2013.

1. SCHMALZER, SIGRID. 2002. Breeding a better china: Pigs, practices, and place in a chinese county, 1929–1937. Geographical Review 92 (1): 1-22. [↑](#footnote-ref-1)
2. Frater, Jamie. "10 Great Ancient Chinese Inventions." Listverse. N.p., 18 Apr. 2009. Web. 24 Nov. 2013. [↑](#footnote-ref-2)
3. Macfarlane, Alan, and Christopher Cullen. 2004. Chinese agriculture. UK: [↑](#footnote-ref-3)
4. Macfarlane, Alan, and Christopher Cullen. 2004. Chinese agriculture. UK: [↑](#footnote-ref-4)
5. Macfarlane, Alan, and Christopher Cullen. 2004. Chinese agriculture. UK: [↑](#footnote-ref-5)
6. Wiens, Thomas B. 1978. Chinese agriculture: Continued self-reliance. American Journal of Agricultural Economics 60 (5): 872-7. [↑](#footnote-ref-6)
7. Needham, Joseph. Science in Traditional China: A Comparative Perspective. Cambridge, MA: Harvard UP, 1981. Print. [↑](#footnote-ref-7)
8. Needham, Joseph. Science in Traditional China: A Comparative Perspective. Cambridge, MA: Harvard UP, 1981. Print [↑](#footnote-ref-8)
9. Macfarlane, Alan, and Christopher Cullen. 2004. Chinese agriculture. UK: [↑](#footnote-ref-9)
10. Macfarlane, Alan, and Christopher Cullen. 2004. Chinese agriculture. UK: [↑](#footnote-ref-10)
11. Neterval, Margaret. "History of Agriculture in China." *History of Agriculture in China*. N.p., n.d. Web. 01 Dec. 2013. [↑](#footnote-ref-11)