

三十六

In the Sui (before Tang)
a long, long time ago
China built a canal
from Beijing to Hangzhou
a million men worked
so that Emperor Yang Di
could inspect his kingdom
in pompous luxury



Chapter 36 – Joseph Needham and the Grand Canal

The first canal I ever remember learning about was the Erie Canal. There was a song we used to sing in elementary school which included lyrics about a mule named Sal hauling barges fifteen miles somewhere along the 360 mile canal stretching from Albany to Buffalo, New York. Of course I knew about the Panama Canal which cut the 16,000 mile journey around the perimeter of South America to under 50 miles. And the 190 mile long Suez Canal which connects the Mediterranean to the Red Sea. But one amazing canal I had never heard of growing up was China's Grand Canal (京杭大運河 Jīng-Háng Dà Yùnhé.)

Stretching north to south well over 1,000 miles (think NYC to Miami, Florida) it wended its way through eastern China from Hangzhou (near Shanghai) to Tianjin (near Beijing.) Construction on the Grand Canal started nearly 2,500 years ago during the Spring and Autumn period. It didn't really become the "Grand Canal" until the short lived Sui Dynasty, about a thousand years later. When completed, it connected the Yellow River 黄河 Huáng Hé, the Qiantang River 钱塘江 Qiántáng Jiāng, and the Huai River 淮河 Huái Hé, with the Yangtze River 长江 Cháng Jiāng and, through a series of tributaries extended west all the way to the ancient capital of 長安 Cháng Ān (near present day 西安 Xī Ān.)

Emperor Suí Yángdì (隋炀帝) conscripted upwards of 5 million people to build the section of the Grand Canal from Luoyang to Beijing during the Sui Dynasty. Nearly one in three of these laborers died. The Grand Canal was created to transport grain from southern China to Beijing and was also used to supply and reenforce military operations. When finished, Emperor Yang Di traveled on a huge boat pulled by hundreds of men. The canal was 40 metres wide, large enough to transport boats which could carry over 100 people. In some ways, the Grand Canal was a project not unlike the Great Wall. It was a labor intensive project which took many centuries to complete.

Some of the most amazing parts of the Grand Canal, however, are to be found in its engineering. Specifically, the locks. Locks are the parts of a canal used for raising and lowering boats, enabling them to navigate in significantly lower or higher terrains. The way a "pound lock" works is by using the gates at either end of a chamber to "lock" water in where the boat is positioned. The gates control the amount of water let in, thus raising and lowering the level of water in the chamber allowing the boats to float up or lower down. Pound locks were first created by the Chinese for the Grand Canal during the 10th century. Altogether, there were 24 locks on the Grand Canal.

To my knowledge, Joseph Needham (李約瑟 Lǐ Yuē Sè), never made it to the Grand Canal. He did, however, recognize both the significance of the “pound lock” and the magnificence of the Grand Canal in Science and Civilization in China, his epic 27 volume compendium of scientific discoveries and inventions from China.

According to Arthur Toynbee in the London Observer, Joseph Needham was able “. . . to interpret the Chinese mind in Western terms, and he is perhaps unique among living scholars in possessing the necessary combinations of qualifications for this formidable undertaking.” The practical importance of Dr. Needham’s work is as great as its intellectual interest. It is a Western achievement which deserves ‘recognition’ at the highest level, but his name is known by very few outside of western scholars of Chinese and the Needham Research Institute at Cambridge University where he was trained as a biochemist, an embryologist, and as an historian of science.



Joseph Needham, like the Grand Canal, was quite remarkable. In his early 20’s, already an esteemed scholar and biochemist at Cambridge, Needham knew almost nothing about China - he became infatuated with both the Chinese language and a young female biochemist from China by the name of 魯桂珍 Lǚ Guìzhēn in 1937. Already fluent in seven languages, at the age of 37, Needham decided to learn Chinese. Within 2 years, he could read nearly 5000 Chinese characters and was able to read authentic Chinese classical texts. He made his first trip to China in 1943, towards the end of WW2, when the Japanese occupied vast portions of China. By flying “over the hump” (the Himalayas) to Kunming in the province of Yunnan, he was able to set up an office and lab at a university in Chongqing, Sichuan. As the result of several chance encounters during the course of his research, Needham

became aware of the magnitude of China's scientific achievements and contributions to the world and was appalled that most of the world outside of China was ignorant of those contributions. So, Needham started a quest which was to be continued



throughout the rest of his life. He would enlighten the West about China's genius through a series of books he was prepared to write. By the time of his death in 1995, 17 volumes of Science and Civilization in China had gone to print (out of a total of 27 volumes) and they rocked the world of science as the West had come to know it. In a strange twist, it rocked the world of many Chinese as well.

In 2009, Simon Winchester published his amazing book The Man Who Loved China: The Fantastic Story of the Eccentric Scientist Who Unlocked the Mysteries of the Middle Kingdom which explored the amazing story of Joseph Needham.

Joseph Needham and the Science and Civilization of China EP1 The Road to China <https://www.youtube.com/watch?v=WiXOctGtsnw>